Emergency Team Coordination Course™ Phase One Report

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14. ABSTRACT (Maximum 200 words):

This research investigated the feasibility of transitioning the crew coordination training developed for Army aviation to emergency department (ED) teams in civilian and military hospitals. Medical malpractice literature and field observations identified areas for teamwork improvement. Team dimensions were formulated, and behaviorally anchored rating scales of teamwork behavior were developed for team evaluation and curriculum development. A 1-day Emergency Team Coordination Course™ (ETTC) training program based on a philosophy of evaluation-driven instruction was developed that included lecture, discussion, and practical exercises to teach team skills. Evaluation instruments were administered, and the course was presented to staff at a Level II trauma center. The major conclusion was that the ETTC™ offers a significant contribution toward meeting the need for improving efficiency and enhancing the quality of emergency care. The course tryout led to other conclusions and recommendations for improving the curriculum content and meeting the time and resource constraints associated with training ED staffs. The results demonstrated that the principles and methods of the Army aviation crew coordination training can be translated into the domain of ED teams. Full-scale curriculum development and validation are recommended.

15. SUBJECT TERMS

Teams	Teamwork	Emergency medicine	Emergency departments	Assessment
Team training	Team performance	Behaviorally anchored rating scales		

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EXECUTIVE SUMMARY

Research Requirement:

This research investigated the feasibility of transitioning the crew coordination training developed for Army aviation to emergency department (ED) teams in civilian and military hospitals.

Procedure:

A review of the medical malpractice literature suggested that teamwork errors are implicated in emergency medicine misadventures. Field observations in EDs provided examples of communication, workload management, team building and leadership, planning, and decision-making wherein teamwork effectiveness and efficiency could be improved. These field observations, supplemented with information on ED operations, resulted in a structure of essential team functions referred to as the Emergency Team Dimensions (TDs). Specifications of superior, acceptable, and very poor team behavior were developed for each of the five TDs as behaviorally anchored rating scales (BARS). These provided a basis for a suite of subjective and objective team assessment instruments. A one-day Emergency Team Coordination Course (ETCC™) training program based on a philosophy of evaluation-based instruction was developed that included lecture, discussion, and practical exercises to teach team skills. The evaluation instruments were administered and the course was presented to staff at a civilian Level II trauma center.

Findings:

The ETCC™ retained the didactic and practicum training approaches of the aviation program, a format well received by the participants and found to be highly effective. The major conclusion is that the fully developed ETCC™ will contribute to improving efficiency and enhancing the quality of emergency care. The course tryout led to other conclusions and recommendations for improving the curriculum content and meeting the time and resource constraints associated with training ED staffs. The objective and subjective assessment instruments were shown to be usable as designed and presented few problems with respect to the time required for data collection or user acceptance. The experience from the tryout provided guidelines for the desirable types of ED performance data and methods for their collection.

Utilization of Findings:

The results demonstrate that the principles and methods of the Army aviation crew coordination training can be translated into the domain of ED teams. Specific improvements to the ETCC[TM] have been identified. These curriculum enhancements should be developed and a formal validation of the training program and its impact on ED performance undertaken.

EMERGENCY TEAM COORDINATION COURSE[TM] PHASE ONE REPORT[1]

A central goal of organizations is maximizing performance and productivity through individual and team effort. Even though work generally occurs in teams and work groups, the traditional focus of institutional education programs and workplace training systems has been on individual rather than team-related skill development. One consequence of the failure to train teamwork skills has been the reliance of organizations on developing teamwork among intact, but frequently marginally performing, work groups. One remedy for enhancing teamwork has been a variety of team building interventions specialists use in organizational development. Tannenbaum, Beard, and Salas (1992) identified four types of team interventions employed from the organizational development perspective: (a) examination of interpersonal processes inhibiting team functioning, (b) clarification of team goals, (c) clarification of individual roles, and (d) identification of problems in task-related processes. The organizational development approach is commonly reported in the medical literature as a means of improving team performance in areas such as nursing (e.g., Adams, 1990; Cohen & Ross, 1982; Cornett-Cook & Dias, 1984), pharmacy operations (Klepcyk, 1990), rehabilitation teams (Halstead et al., 1986), and hospital management (Drexler, Yenny, & Hohman,1977; Farley & Stoner, 1989). Typically, organizational development interventions are characterized by a long-term, costly investment in data gathering, problem-solving, and action-planning processes involving the team and a consultant (e.g., Miles & Schmuck, 1989). However, interest has recently turned to the need to identify teamwork skills and devise team training to complement individual, task-related skills.

From their research on military teams, Glickman et al. (1987) identified two types of behaviors emerging during the course of training: taskwork, the competencies of task-related skills; and teamwork, the behaviors necessary to function as a member of a team. Teamwork behaviors that differentiate effective teams include effective communication, coordination, compensatory behavior, mutual performance monitoring, exchange of feedback, and adaptation to varying situational demands (Oser, McCallum, Salas, & Morgan, 1989). Conceptualizing teamwork as a set of identifiable and trainable skills encourages a proactive approach to improving team performance. This contrasts with organizational development interventions, which are reactive responses to dysfunctional teams.

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[1]Emergency Team Coordination Course and ETCC are registered trademarks of Dynamics Research Corporation.

Although the concerns of team building employed in organizational development are similar to those in team training, team training identifies "the specific knowledge, skills, and attitudes ... are determined prior to the start of training, and learning objectives are established" (Tannenbaum & Yukl, 1992, p. 431). The aim is to teach specific team behaviors based on what is known about how effective teams operate, and to tie performance outcomes to the content and timing of the training intervention. Interest in the team training approach has increased in work environments as diverse as business and industry (Sundstrom, De Meuse, & Futrell, 1990), military organizations (Swezey & Salas, 1992), and commercial aviation (Wiener, Helmreich, & Kanki, 1993).

Applications of the team training approach have only recently begun for health care providers. The area of anesthesiology saw the first efforts to teach crisis management and team resource management techniques to practitioners (Howard, Gaba, Fish, Yang, & Sarnquist, 1992; J. Cooper, personal communication, April 1, 1994). Research is now underway to examine team training requirements for operating room (OR) teams (Ewell & Adams, 1993; Helmreich & Schaefer, 1994). In line with these efforts, Dynamics Research Corporation (DRC) developed a team training course for hospital emergency department (ED) personnel. The ED and OR share the characteristics of high stakes activities performed by interdependent, highly skilled individuals. However, the variability of both patient volume and acuity in the ED singles it out as the department most in need of effective team response to unpredictable, time-compressed events. The course development described in this report is a spinoff of previous work DRC accomplished for the Army Research Institute (ARI) that focused on Army aircrew coordination (Simon, 1990; Simon, 1991; Pawlik, Simon, Grubb, & Zeller, 1992; Pawlik, Simon, Grubb, & Zeller, 1993; Grubb, Simon, & Zeller, 1992; Simon, 1992; Grubb, Leedom & Simon, 1993; Simon & Grubb, 1993).

Aviation Crew Coordination Training Background

DRC worked with aviation specialists from the U.S. Army Aviation Center to develop a field-exportable training package for improving crew coordination. The training was developed using an "evaluation-driven instruction" model. The first step in this curriculum development model was to define the desired behavior and skill outcomes of the trainees. Then, the training was developed based on what students must know and do. In the case of Army aviation, the training was based on 13 well-defined, observable criteria for crew behaviors. These behaviors are called the Crew Coordination Basic Qualities in Army Aviation (Table 1). DRC developed behaviorally anchored rating scales for each of the Basic Qualities, and task-specific coordination activities were written into the flight tasks described in the Army's Aircrew Training Manuals.

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Table 1

Army Aviation's Crew Coordination Basic Qualities

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1. Establish and maintain flight team leadership and crew climate

2. Premission planning and rehearsal accomplished

3. Application of appropriate decision making techniques

4. Prioritize actions and distribute workload

5. Management of unexpected events

6. Statements, directives clear, timely, relevant, complete and verified

7. Maintenance of mission situational awareness

8. Decisions and actions communicated and acknowledged

9. Supporting information and actions sought from crew

10. Crewmember actions mutually cross-monitored

11. Supporting information and actions offered by crew

12. Advocacy and assertion practiced

13. Crew-level after-action reviews accomplished

The training was based on macro- and micro-level teamwork behaviors and provided a multimethod approach to instruction. The macro behaviors (Basic Qualities) served to organize the curriculum. The micro-level behaviors were written into the Aircrew Training Manual tasks and involved specific actions such as altitude call-outs during approach, call-outs when a pilot visually transitioned from outside to inside the cockpit, and methods for transferring flying control from one pilot to the other. Academic training involved classroom discussion, exercises, and vignettes highlighting error patterns and introducing team coordination techniques. To the maximum extent possible, coordination techniques were defined within the context of specific flight tasks, conditions, and standards. Course participants were given simulator-based missions to provide ample opportunity for demonstration, practice, and instructor feedback of the new teamwork skills. The evaluation system was based on observable criteria and the behaviorally anchored rating scales.

To assess the impact of the training on aviator performance, a field validation experiment was conducted at Fort Campbell, Kentucky. Two helicopter battalions from the 101st Aviation Brigade were trained in the new crew coordination techniques. Pre- and post-training evaluation flights were conducted with each of the participating aircrews. It was found that safety-related crew coordination errors were reduced anywhere from 43 to 100% after training. These were the same types of errors that had been identified earlier in Army aviation accident data. In addition to reducing certain types of coordination errors, the comparative data also revealed a greater than 20% improvement in mission performance as measured by navigational and timing accuracy, exposure to enemy air defenses, instrument flight recovery, emergency flight procedures, and mission accomplishment. Overall, the number of aircrews rated either good or superior doubled within the two battalions (Simon & Grubb, 1993; Leedom & Simon, in press). Following the validation testbed, the training and evaluation system was finalized, and now it is being deployed worldwide.

Medical Malpractice and Emergency Team Error

Both military and civilian aviation data reveal that human error accounts for about 70-80% of all aviation accidents and incidents. Coincidentally, studies in medical specialties such as anesthesiology show similar rates of human error (Chopra, Bovill, Spierdijk, & Koornneef, 1992; Gardner-Bonneau, 1993). Leape (1994) found in a statewide study of New York hospitals that hospital emergency rooms had the highest rate of preventable inside-the-hospital adverse events (2,669 of 2,860 events, or 93.3%). In developing our program of research, we reviewed the general objectives of emergency medicine and the structure of ED medical teams. In defining the context for conducting research on emergency medical teams, three characteristics of emergency medicine seemed to dominate: (a) quick reaction, (b) uncertainty regarding patient condition and available resources, and (c) small margin of error. These characteristics are further illustrated by two areas of central concern to the field of emergency medicine: rapid diagnosis and treatment of myocardial infarction, and advanced trauma life support.

Rapid Diagnosis and Treatment of Myocardial Infarction

This area of concern deals with the large number of deaths attributable in the U.S. each year to cardiovascular disease. An important aspect of responding to this challenge is the type of advanced cardiac life support that EDs provide. According to guidelines published by the American Heart Association, advanced cardiac life support requires a number of critical steps, including the use of special equipment to maintain ventilation and circulation, electrocardiograph monitoring and the quick recognition of arrhythmia, rapid stabilization and therapy of patients with cardiac or respiratory arrest, and the early treatment of myocardial infarction with thrombolytics (Emergency Cardiac Care Committee and Subcommittees, 1992). Given the

extremely short time after which loss of circulation or ventilation can lead to death or neurological impairment, the emergency medical team must be highly proficient in conducting each of the steps in a rapid and orchestrated manner. That such procedures are not always effectively carried out is suggested by the fact that a leading category of malpractice claims in the ED is the failure to diagnose myocardial infarction.

Advanced Trauma Life Support

A second area of concern is advanced trauma life support, another major responsibility of emergency medicine. According to the American College of Surgeons (American College of Surgeons Committee on Trauma, 1988), trauma mortality peaks at three different points in time. The first peak occurs within seconds or minutes of injury. These deaths are frequently due to lacerations of the brain, brain stem, high spinal cord, heart, aorta, or other large blood vessels. A second peak in mortality occurs within a few hours after the victim has been transported to the ED. This period is often referred to as the Golden Hour, a critical period in which emergency medicine teams have a profound effect on patient outcome. Deaths during this period of patient care are frequently due to subdural and epidural hematomas, hemopnuemothorax, ruptured spleen, lacerations of the liver, pelvic fractures, or multiple injuries with significant blood loss. Most of the procedures performed as part of advanced trauma life support focus on reducing these contributors to mortality. Evidence of team error is partly reflected in malpractice data for EDs showing the relatively high incidence of misdiagnosis of fractures and dislocations, foreign bodies, and hemorrhaging. A third peak in trauma mortality occurs within several days or weeks of the injury, after the patient has been admitted to another department in the hospital. Deaths in this latter category are most frequently due to sepsis and major organ failure. Procedures performed during initial emergency care can significantly influence the mortality rate associated with this third peak (American College of Surgeons Committee on Trauma, 1988).

Emergency medical personnel see the patient only within the first several hours of hospital care, usually under reactive circumstances in which they have less than full knowledge of the patient's medical state. In many instances, decisions on patient care must be made before relevant laboratory tests can be conducted and fully interpreted. The reactive nature of emergency medicine is further emphasized by the fact that a patient's presenting condition determines his or her urgent or emergent status regardless of available medical resources and personnel. These factors combine with the often hectic nature of EDs to create periods of excessive patient load and the continual need to assign and reassign resources based on the current situation. As a result, a great opportunity exists for individual patient care to be compromised through poor coordination of the emergency staff and resources.

A principal focus of this research project is the reduction of team errors in ED patient care. To gain some idea of where errors occur, we examined data collected by the St. Paul Fire and Marine Insurance Company (1989). Table 2 shows a breakdown of alleged incidents of ED malpractice. As can be seen, a majority of the bad outcomes involve misdiagnosis of the patient's true condition. One of the basic assumptions for the emergency team coordination training is that improved information management and coordination of available personnel and hospital resources will result in more accurate diagnoses, fewer medical errors, and enhanced care.

The Armed Forces Institute of Pathology (as cited in Risk Management in Emergency Medicine, 1990) analyzed ED error data by type of case and process error. The study highlighted the same types of cases identified in the St. Paul (1989) data. The leading type of process error was listed as "return visit syndrome," implying the ED failed to correctly diagnose the patient's condition on the first visit. Other process errors included use of a non-physician care provider, failure to consult other hospital services, and the misreading of test data. What is suggested by these data trends is the ED's failure to have adequate cross-checking or other safeguards that might serve to detect individual oversights.

Error data from a third study (Trautlein, Lambert, & Miller, 1984) also revealed misdiagnosis to be a leading factor in ED malpractice. Other types of errors include inadequate examination, inadequate ordering of tests, misreading of test results, failure to admit patients to other hospital services, and so forth. Trautlein et al. (1984) categorized errors by emergency team member (Table 3). In more than 90% of the cases, a physician is blamed for committing an error. Based on our observations in Army aviation and in EDs, we believe that such statistics do not present an adequate picture of the problem. Just as physicians often have been singled out for responsibility in malpractice cases, so it was common practice to blame aviation accidents on a single error made by the pilot whose hands were on the controls at the instant of impact. Our investigation of crew coordination errors in aviation and EDs has led us to conclude that team error often occurs as a result of a chain of errors involving several members of the team.

Team Training Needs in Emergency Medicine

Based on available data on ED errors (St. Paul Fire and Marine Insurance Company, 1989; Armed Forces Institute of Pathology, 1989; Trautlein et al., 1984), it was anticipated that error patterns similar to those identified in Army aviation would be demonstrated in emergency teams. Like cockpit crews, these teams are composed of highly trained, highly motivated individuals working in a high stakes, time compressed, stressful environment. The research project being reported here is

Table 2

Top Ten Allegations for Emergency Department Malpractice, 1984 through 1988

Misdiagnosis of fracture/dislocation	10.8%
Misdiagnosis of myocardial infarction	5.3%
Misdiagnosis of infection	5.3%
Misdiagnosis of abdominal pain	4.6%
Misdiagnosis of appendicitis	4.4%
Misdiagnosis of foreign body	4.4%
Improper treatment: insufficient therapy	3.8%
Improper treatment: during examination	3.8%
Improper treatment: infection	3.6%
Misdiagnosis of hemorrhaging	3.2%

Table 3

Malpractice in the Emergency Department by Person

Hospital resident	32.0%
Full-time emergency physician	27.0%
Moonlighting resident	26.0%
Nurse	6.5%
Attending physician	6.5%
Patient	4.0%
Other	1.0%

designed to determine if a crew coordination training and evaluation system similar to the one developed in aviation can be used with emergency teams. If the outcomes of this research mirror the military experience, emergency care providers can reduce error patterns by more than 40% with improved patient outcomes and a reduced liability risk.

We began to direct attention to emergency medicine in the fall of 1993. We approached a number of hospitals to assess whether the idea of teaching teamwork skills in an emergency medical environment had merit. Without exception, emergency medical personnel indicated that the idea was worth developing. Over the past year, a number of hospitals either signed a formal memorandum of agreement with ARI or cooperated with the project on an informal basis. Hospitals that were approached and either formally or informally indicated an interest to cooperate are listed in Table 4.

Technical Approach

As described earlier, the Aviation Crew Coordination course resulted in significant gains in crew performance and reductions in crew errors. The course materials and evaluation instruments had been refined through cooperative efforts with standardization instructor pilots and tested in preliminary and validation experiments. Repeating the extensive developmental effort undertaken for the aviation course did not seem warranted for emergency teams for a number of reasons. First, researchers have identified the core behaviors that differentiate effective teamwork (Oser et al., 1989; Fleishman & Zaccaro, 1992). Second, the aviation curriculum contained a variety of instructional methods that had proven effective. Third, the aviation program placed a heavy emphasis on training outcome assessments that included behaviorally anchored rating scales, an attitude survey, and mission performance measures. This multidimensional assessment approach provided important insights into the optimal instructional strategy and program impact.

The developmental approach used in this project sought to identify the similarities in team functioning that exist between the aviation and ED environments and to retain the instructional approach that proved effective with the aviation crews. In those instances where the two environments differ, we would develop new conceptualizations of team behavior, instructional approach, or assessment strategy. Because the scope of this effort was limited, a tryout of the curriculum and evaluation approach was used as part of the first year's research focus.

To summarize, the technical goals of this project were as follows:

1. Using the methods developed for aviation crews, devise a team training curriculum and set of evaluation instruments for ED teams.

2. Try out the curriculum and evaluation tools with the staff of a community hospital.

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Table 4

Participating Hospitals and Medical Centers

Civilian	Military
Emerson Hospital	Brook Army Medical Center (San Antonio)
Lowell General Hospital	
Massachusetts General Hospital	Lyster Army Community Hospital (Ft. Rucker)
Metro West Hospital at Framingham	
Newton-Wellesley Hospital	Madigan Army Medical Center (Tacoma)
Rhode Island Hospital, Brown University	Martin Army Community Hospital (Ft. Benning)
University of Alabama Birmingham Medical Center	
University of Massachusetts Medical Center	
University of Texas Health Science Center at San Antonio	

Preliminary Observations and Analysis

Method

During the first phase of this research project, researchers spent approximately 250 man-hours observing ED activities in 10 hospitals (Level I and Level II trauma centers). The 10 hospitals were both teaching and community hospitals and were drawn from different regions of the United States. Observations were generally made by pairs of observers--one assigned to accompany ("shadow") an attending physician and the other to accompany a nurse, typically the charge nurse. This method provided observations on the medical and operational aspects of the ED. Fortuitously, it frequently provided two perspectives on the same event, which provided a rich source of material to verify team strengths and weaknesses. These observations covered a variety of information gathering needs that included:

1. Observe team behaviors

2. Identify formal staffing organization and informal social patterns

3. Understand the process of patient assessment, treatment, and disposition

4. Observe patient volume and transitions in workload

5. Obtain good and poor examples of teamwork

6. Observe error chains

The 13 Aviation Basic Qualities shown in Table 1 provided the structure to make, record, organize, and analyze teamwork process and operational issues in the ED. Observers made written notes of significant events as they occurred and later developed a narrative description and interpretation of each event. These field notes were used in later analyses and curriculum development activities.

Results

Errors

When observers noted an error, it was nearly always due to a chain of errors within the ED. For instance, a physician might overlook a possible deep vein thrombosis (DVT) in the leg (error number one), but a nurse who is also caring for the patient suspects DVT and does not inform the physician (error number two), nor does the nurse inform other service personnel to handle this patient as if DVT is a possible diagnosis (error number three). Other examples of emergency medical error chains are provided in Table 5. Error chains were instituted by otherwise highly qualified medical providers who overlooked, misread, or did not effectively use critical pieces of information regarding patient condition and which were nearly always exacerbated by such factors as the general organization of the ED, its operating procedures, utilization of the staff, utilization of consultants, and so forth.

Emergency care services are delivered by an interdisciplinary staff who have distinct perspectives and who perform in a hierarchical structure that has both rank and experience differences. We observed a number of coordination errors similar to those listed earlier from the research on aviation teams where (a) task responsibilities are not clearly defined, (b) task priorities and workload are constantly shifting, and (c) role differentiation contributes to interpersonal disharmony. Any number of issues can complicate this picture and will affect the willingness or ability of individuals to share information, delegate responsibilities, and work as a team member.

Table 5

Examples of Emergency Medical Error Chains

Clinical incident	Team-related errors
The day-shift charge nurse, Roberta, returned from lunch. On her return, Dr. Allard told her that a patient she had been attending prior to lunch needed some IV antibiotics. She obtained the chart from the nurses' "To Do" holder, and prepared the first of the two medications. On reaching the patient's bedside, Roberta noticed that the medication was already being administered. The nurse who had relieved her for lunch, Alice, had started the IV. Alice had been told earlier by the MD to administer the medications but left the chart in the "To Do" box as a reminder to start the second medication. Before she could start the second medication, Alice was called away to handle a phone call. No note was written and no indication was given that the medication was in the process of being given. If the medicine had not been administered with an IV with its obvious paraphernalia, this could have been a case of the patient getting two doses of the same medication.	Execute plans and manage workload • workload distribution • resource management • maintenance of situational awareness
A 52-year-old male patient complaining of an achy shoulder was in the ED. The nurse, Lorinda, noted a brief run of ectopy but said nothing to Dr. Morales, who had detected a normal rhythm. Lorinda was relieved when Dr. Morales ordered an EKG. She did not want to tell Dr. Morales that she detected something that he overlooked.	Apply problem solving strategies • assertion and advocacy
A 24-year-old female entered the ED and complained of back pain. Due to the nature of her complaint, x-rays were needed. Before escorting the patient to the x-ray department, the RN questioned physician #1 about the woman's pregnancy status. Physician #1 curtly replied that she was "ok" for the x-ray. Later, an oncoming physician (#2) questioned the RN about the woman being x-rayed. Physician #2 was upset about the order after learning from the patient that she was sexually active during the past two weeks. The RN attempted to explain. She was sharply reprimanded by physician #2, "That woman should have had a pregnancy test done first!" Physician #2 did not discuss the matter with physician #1.	Maintain team structure and climate • cultivate team climate • promote professional respect
In one ED, the staff habitually refers to patients as "Beds," e.g., "Bed 5 needs a meal"; "Bed 3 needs to be discharged." During one period, a series of recurring confusions percolated through the staff as a patient from Bed 8 was transferred to Bed 7, and Bed 7 was transferred to Bed 9. Bed 8 had to be opened to receive an incoming ambulance patient needing a monitor. Not everyone was clear that a change had been made or where the patients were relocated. Thus, as patient care actions needed to take place, or questions like "Have the labs come back on Bed 8 yet?" arose, the identity of the actual patient in question remained ambiguous.	Exchange information • common and accepted terminology used • supporting information and actions offered by team • decisions and actions communicated and acknowledged
An 11-year-old male with a broken clavicle was placed in a treatment room. The physician ordered a "figure eight" brace to be applied. As the RN tightened the brace across the boy's shoulders, he attempted to be brave and blinked back tears. Noting his pain, the RN stopped. When she left the room, the MD inspected the brace, decided that it was not nearly tight enough, and adjusted it to ensure proper therapeutic effect. The patient was released. The MD did not tell the RN that the brace was put on improperly.	Improve team skills • situational learning

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Table 5

Examples of Emergency Medical Error Chains (continued)

Clinical incident	Team-related errors
At the nearly bitter end of a pediatric resuscitation, the doctor ordered a calcium chloride intravenous injection. A young nurse, inexperienced with resuscitation, administered *potassium* chloride. The lethal injection most probably did not change the inevitable outcome for the patient. Unfortunately, the RN and physician never spoke later of the incident. An opportunity to provide significant instruction, identify the source of the error, and offer team support was lost. Several months later, the hospital was sued for $1.5 million.	Improve team skills • recurring clinical case review • recurring team performance review
The shift began in one ED with three RNs, an aide, a secretary, and the MD. Donna, the charge nurse, was helping the physician to draw blood on a small child. Ann, the triage nurse, answered a (BLS) call about a cardiac patient being transferred from the jail. A security guard overheard the call and mentioned it to Donna, who nodded in appreciation, but did not request that he stay. A second call within minutes informed the ED of a patient en route from his physician's office. This touched off a discussion at the nurses' station about whether the office patient was a direct admission. The inmate arrived and the EMS crew was directed by the secretary to the only open cardiac monitored bed. Simultaneously, the gentleman arrived from the doctor's office and presented at triage, anxious and complaining of chest pain. When Ann escorted him to the acute area, there were no available stretchers, and both nurses were with patients.	Execute plans and manage workload • resource management • maintenance of situational awareness
Ten-year-old male, Billy, reported to ED at 1900 hrs complaining of a headache after an unhelmeted fall from a bicycle. The triage nurse documented LOC (loss of consciousness), based on a statement from one of Billy's friends. Dr. Rivera examined the child at approximately 1930 and questioned the documented LOC. The mother stated that a younger sister reported that "Billy started to cry as soon as he fell off the bike." Billy had a severe headache and was drowsy, but could answer questions about the date, the President, etc., and appeared generally lucid. Dr. Rivera, reluctant to order a CAT scan during on-call night hours, expressed his disturbance to a staff member about the triage nurse writing LOC on the chart. He felt that she wanted to "dictate" his treatment for the child. Dr. Rivera decided to give Billy something to eat and observe him for the next half hour. The primary nurse pointed out that Billy seemed "too sleepy." Dr. Rivera, abruptly responded that Billy had "just played hard all day" and that he would probably send Billy home, but needed a little more time to decide. At 2045 hrs, the primary nurse again said that she was "uncomfortable" with the way Billy looked. Dr. Rivera ordered a CAT scan, but continued to voice annoyance that he was being coerced. By 2145 hrs, the CAT scan results came back with a diagnosis of epidural hematoma. Dr. Rivera alerted the primary nurse and discussed the matter with the parents. A determination was made to transfer Billy to a nearby medical center to be seen by a pediatric neurologist. Dr. Rivera's need to assert himself as "being in charge" limited his investigation of the triage and primary nurses' concerns. It was only after a second expressed concern that he took action. This led to a high risk delay in Billy's diagnosis.	Maintain team structure and climate • establish leadership • cultivate team climate • promote professional respect • monitor team member attitudes Apply problem solving strategies • decision making techniques • advocacy and assertion

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Table 5

Examples of Emergency Medical Error Chains (continued)

Clinical incident	Team-related errors
A 36-year-old overweight male presenting with a swollen and sore right calf, was brought to the examination room. The charge nurse made a cursory exam and stated to the patient, "may be phlebitis." She did not voice her thoughts to the staff nurse or the physician. The patient underwent various tests and an examination before a definitive diagnosis could be made. During this time, the patient was ambulatory. More than two hours later, the charge nurse became concerned and asked the physician about a diagnosis on the man. Several interruptions later, he obtained the test results, and informed the charge nurse that the studies were positive for DVT (deep vein thrombosis). He asked that she be sure that the patient was lying down. Passing the patient's room she noted that he was. She did not tell the staff nurse or the patient of the diagnosis. Moments later, the staff nurse overheard that the patient was being admitted and needed a chest X-ray. Still uninformed of the diagnosis, she placed him in a wheelchair to be transported.	Information exchange • supporting information and actions sought from team • supporting information and actions offered by team • decisions and actions communicated and acknowledged

Emergency Department Organization

A number of organizational factors can also influence team member coordination and performance. Potential factors of the ED setting include:

1. Lack of functionally organized teams

2. Perceived competition between emergency physicians and physicians from other departments in the hospital

3. Staff to patient ratio (i.e., staff that is task over- or underloaded)

4. Lack of or difficulty in obtaining backup resources and personnel

5. Misunderstanding of how to effectively use physician assistants, nurse practitioners, and medical technicians

6. Rotation or turnover among the professional staff, the terms of employment (permanent, resident rotations, part-time, per diem, and moonlighters), and institutional affiliation (i.e., employed by a contractor or the hospital)

7. The degree of staff commitment to the field of emergency medicine (e.g., is emergency medicine a career or is the staff member simply assigned to the ED; is the staff member certified or preparing for certification in emergency medicine, etc.)

Organizational flow patterns affect team coordination in a number of ways. Based on our observations of EDs, we identified a number of factors that vary from hospital to hospital and which influence team coordination:

1. The availability of separate facilities for fast-track and critical care patients. Such facilities free-up department resources for more critically ill patients and allow care providers to better focus the staff's workload management efforts.

2. The partitioning of emergency medicine patients by type of care. For example, trauma patients who are likely to be seen by a surgeon versus cardiac patients who are more likely to be admitted to coronary care. Planning and resource allocation are aided by this partitioning.

3. The physical layout of patient beds. For example, visual access from a central location versus distributed across several rooms. Visual access helps to maintain team structure and climate because staff members tended to focus their activities in one, shared area.

4. The availability of a centralized board or computer system for posting patient information and the status of their care. Centralized information systems aid the staff by providing timely information and support to decision makers. With centralized information, staff members have better situation awareness.

5. The proximity of lab and radiological services, including the mechanisms for ordering such services and receiving results. Lab and radiological services that are dedicated to the ED reduce problems of coordination and improve the timeliness of services.

6. The physical layout of the central work area for staff members. Doctors and nurses tend to collect themselves in physically different areas of the department's work area. Facilities designed to encourage physical interaction tend to foster staff communication and coordination.

There were other examples of how the ED's organization affected team performance, but it was decided to focus on "performance shaping functions." Conceptually, this decision is illustrated by a classical "Input - Process - Output" model (Figure 1). Project focus was on the "process" component because (a) we did not have the resources to re-design hospital EDs and (b) based on our aviation experience, our expertise was in teamwork. The "input" remedies proposed in the training package include only low-cost, minor "fixes" to improve communications, e.g., using a highly visible white board for centralized patient information.

Communications

Given the reactive nature of emergency medicine and the interdisciplinary nature of the team, accurate, reliable, and timely communication among staff members is absolutely essential. The importance of good communication, including good documentation of patient status and physician orders, cannot be overemphasized. A sampling of the communication and documentation problems frequently associated with ED patient care include the following:

1. Misplaced or unavailable patient charts

2. Unknown status of lab and x-ray orders and results

3. Unclear notes on the patient chart that mislead the nurse or physician

4. Unclear verbal or written discharge instructions

5. Unclear orders with no acknowledgement of receipt by the one who will carry out the orders

Results

Patient satisfaction, staff satisfaction, teamwork measures, throughput measures, critical pathways, patient outcomes

Performance shaping factors

Maintaining team structure and climate, applying problem solving strategies, executing plans and managing workload, supporting team with information and actions, improving team skills

Predisposing conditions

Team size/composition/climate/turnover, staff experience and training, physical layout, availability of specialists, proximity of lab/radiological services, and patient load

E-220U

Figure 1.   Input-process-output framework used to define project focus.

6.   Lack of information regarding incoming Emergency Medical Service (EMS) runs so that ED staff can allocate resources effectively

Although the need for careful documentation is obvious, some physicians feel torn between time spent in actual patient care versus time spent in completing the required documentation for each patient. The perceived tradeoff between better documentation and higher patient turnover is especially significant where ED physicians feel pressured by staff limitations and high patient loads.

Models for Curriculum and Evaluation Instrument Development

Experience with using the aviation Basic Qualities (refer to Table 1) to facilitate ED observations pointed out the need to review the Basic Qualities structure prior to developing the curriculum and evaluation instruments. The Basic Qualities successfully captured all the teamwork functions operating in the EDs surveyed. However, the relative importance of some team behaviors and the quality of other enabling behaviors supporting the Basic Qualities did not exactly parallel those in aviation. These incompatibilities required a review and revision of the aviation Basic Qualities structure. Sufficient observational data had been obtained to make these revisions.

Figure 2 shows the hierarchical structure used to guide curriculum and evaluation development. The Emergency Team Dimensions (TDs), derived from the aviation Basic Qualities, provided a conceptual framework of team functions tailored to emergency teams. Behaviorally anchored rating scales (BARS) described observable team behaviors associated with the TD structure. The BARS were essential to both the creation of the course curriculum and the evaluation of team behaviors. The Emergency TDs also provided a basis for creating clinical team performance models that fuse team processes with existing clinical algorithms. These models are examples of how team processes are integral to the assessment, treatment, and disposition of a patient. The clinical team performance models also provide a framework for assessing team behaviors in a variety of commonplace clinical presentations, such as trauma or pediatric cases.

The following sections describe the Emergency TDs, BARs, and clinical team performance models. The team coordination course curriculum and evaluation instruments were created from these structures.

Emergency TDs. The first analysis consolidated closely associated aviation Basic Qualities to yield a smaller list of essential team functions.

Aviation Basic Qualities

Emergency Team Dimensions

Behaviorally Anchored Rating Scales

Clinical Team Performance Models

Emergency Team Coordination Course

Team Evaluation (Macro Behaviors)

Team Evaluation (Micro Behaviors)

Figure 2. Curriculum and evaluation instruments development model.

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This list became the five Emergency TDs:

1. Maintain team structure and climate
2. Apply problem-solving strategies
3. Execute plans and manage workload
4. Support team with information and actions
5. Improve team skills

At the first level of indenture under the 5 Emergency TDs were 25 primary descriptors, which provide descriptive teamwork behaviors to the TDs. These are shown in Table 6.

None of the aviation Basic Qualities were excluded from the Emergency TDs, as shown in the Table 6 cross-references between the TDs and Basic Qualities. However, the task requirements, time frames for activities, and operational characteristics of emergency teams necessitated some team functions and behaviors particular to that environment. For example, emergency personnel need to form teams (TD 1, Maintain Team Structure and Climate) for critical events (such as a trauma), much as a flight crew forms to prepare for a specific mission. However, in contrast to aircrews, team forming in the ED also needs to take place among a larger group of individuals at shift changes. The organizational needs are larger in scope (e.g., two or more teams may be formed) and cover a variety of operational and unpredictable clinical "missions."

Another example is shown in TD 5, Improve Team Skills. Aircrews undertake an after-action review of a just-completed mission. Emergency teams need to do likewise for a specific clinical event. However, emergency personnel regularly review cases, conduct mortality and morbidity reviews, and engage in learning new skills and procedures. Thus, TD 5 needed to incorporate both situational learning (e.g., after-action reviews of a case, on-the-spot learning of a specific task) and more programmed educational and team feedback procedures (e.g., periodic reviews of teamwork within the entire ED, critical event review from a teamwork perspective). As in TD 1, the teamwork enabling behaviors modified, but did not supplant, team behaviors associated with the aviation Basic Qualities.

Behaviorally anchored rating scales (BARS). Another analysis resulted in BARS based on the new Emergency TDs. Again, sufficient observational data had been collected to generate specific behavioral descriptors of Superior, Acceptable and Very Poor ratings for each of the five dimensions. This analysis was an essential step in curriculum development. Because the training philosophy was evaluation-driven instruction, the fundamental descriptions of effective and ineffective teamwork needed to be specified. The BARS developed for the Emergency TDs are provided in Appendix A.

Table 6

Emergency Team Dimensions with Aviation Basic Qualities Cross-references

Emergency Team Dimension	Emergency Team Dimension primary descriptors	Applicable aircrew training evaluation guide criteria	Aviation BQ and guide criteria number
1. Maintain team structure and climate	Establish leadership	None	
	Organize the team	Premission flight planning	BQ2a
	Cultivate team climate	Leadership style	BQ1a
	Professional respect	Professional respect	BQ1b
		Resolution of disagreements	BQ1c
	Team member attitudes	Crewmember attitudes	BQ1d
2. Apply problem-solving strategies	Long-term planning	None	
	Situational planning	Premission flight planning	BQ2a
		Premission rehearsal	BQ2b
	Decision-making techniques	High time stress decisions	BQ3a
		Mod/Low time stress decisions	BQ3b
	Advocacy and assertion practiced	Advocacy	BQ12a
		Rank or experience intimidation	BQ12b
3. Execute plans and manage workload	Perform triage	None	
	Task prioritization	Task prioritization	BQ4a
	Workload distribution	Workload distribution	BQ4b
	Resource management	Crew preparation and composure	BQ5a
		Resource management	BQ5b
	Team members actions mutually cross-monitored	Scanning for crew error	BQ10a
	Maintain situational awareness	Awareness level of crew	BQ7a
		Awareness of factors inhibiting attention	BQ7b
	Delegate responsibilities	None	
	Replanning	Inflight replanning and rehearsal	BQ2c

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Table 6

Emergency Team Dimensions with Aviation Basic Qualities Cross-references (continued)

Emergency Team Dimension	Emergency Team Dimension primary descriptors	Applicable aircrew training evaluation guide criteria	Aviation BQ and guide criteria number
4. Support team with information and actions	Statements and directives clear, timely, relevant, complete, and verified Common, accepted terminology used	Adequacy and timeliness Clarity Acknowledgement	BQ6a BQ6b BQ6c
	Supporting information and actions sought from team	Solicitation of crew input Solicitation of crew assistance	BQ9a BQ9b
	Supporting information and actions offered by team	Anticipation and offering of required information Anticipation and offering of required assistance	BQ11a BQ11b
	Decisions and actions communicated and acknowledged	Communication of decisions and actions Clarification and acknowledgement	BQ8a BQ8b
5. Improve team skills	Situational learning and teaching Recurring clinical case review Recurring team performance review	Critique and improve crew performance	BQ13

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Clinical team performance models. Successful application of the TDs to clinical practice required analysis of two issues: whether team-related behaviors can be standardized in the performance of direct patient care, and whether a single team behavior process model can be appropriate whatever the team composition or patient presentation. A fusion of team behaviors with clinical processes in a single generic model would provide (a) an organizing structure for the course practicum exercises, (b) a teaching aid for making the connection between team process and clinical algorithms, and (c) an assessment tool for evaluating clinical events.

The first issue was addressed by examining critical-care algorithms used in certification courses such as Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), Pediatric Advanced Life Support (PALS), Advanced Trauma Life Support (ATLS), and Trauma Nurse Core Course (TNCC). Although these five algorithms are associated with different patient presentations, they share three steps in the application of assessments and life-saving interventions (i.e., the "ABC's" of critical patient care):

1. **A**irway assessment
2. **B**reathing assessment
3. **C**irculation assessment
4. Other assessments (e.g., cardiac status, IV access, neurological status)

This analysis showed that standardization of the types and sequence of assessments has been established for the most critical aspects of patient presentation. Because critical care situations commonly involve a <u>team</u> of care givers, it appeared that a high level of information exchange; coordination of assessments and interventions; and tightly coupled decision-making, planning, and task execution would be required to carry out these algorithms. However, team requirements were neither specifically noted in the algorithm training materials nor were students evaluated in a team environment for execution of the algorithm. Because the sequence of activities is well-established, it appeared that standardized team behaviors could be introduced into the clinical algorithm structure.

The hypothesis that a single team process model could be fused with the common clinical algorithms led to the development of the Clinical Team Performance Model. The first draft diagrammed each behavioral step in the performance of direct patient care in an emergency setting. Next, macro-level behavior categories (TDs) were linked to every element in the clinical emergency process to suggest specific behaviors required at various points in the clinical process (i.e., micro-level behaviors). The Clinical Team Performance Model-Critical Care is shown in Figure 3. Models covering other patient presentations (e.g., pediatric, non-acute) also were developed. These models

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ESTABLISH LEADER
body language
directives

ASSEMBLE TEAM
preplanning
"a code"

DESIGNATE ROLE FUNCTION
leader
airway
communications
defibrillation
documentation
primary nurse

INFORMATION EXCHANGE
critical vs significant

airway, breath sounds
rhythm dx
vital signs
mechanism of injury

chief complaint
age, sex
allergies
PMH
cardiac hx
DNR status
name

IMPLEMENT TASKS
c-spine immobilization
oxygen, intubation
algorithm, ?defib
IV access
vs monitor, b/p
meds
lab, abg
x-ray, CT
Ekg
rectal
foley
ngt

ASSESSMENT
Ventilation - bs, color, abg
vs, urine output
loc
rhythm
2° survey - lac, fx, abdomen

PLANNING
Vent changes, oxygen
pressors, fluids
central access
CT, x-rays
meds
thrombolytics
pacer

PT DISPOSITION
OR, ICU, CCU
consults, admit
terminate efforts
pt/family communication

TEAM EVALUATION
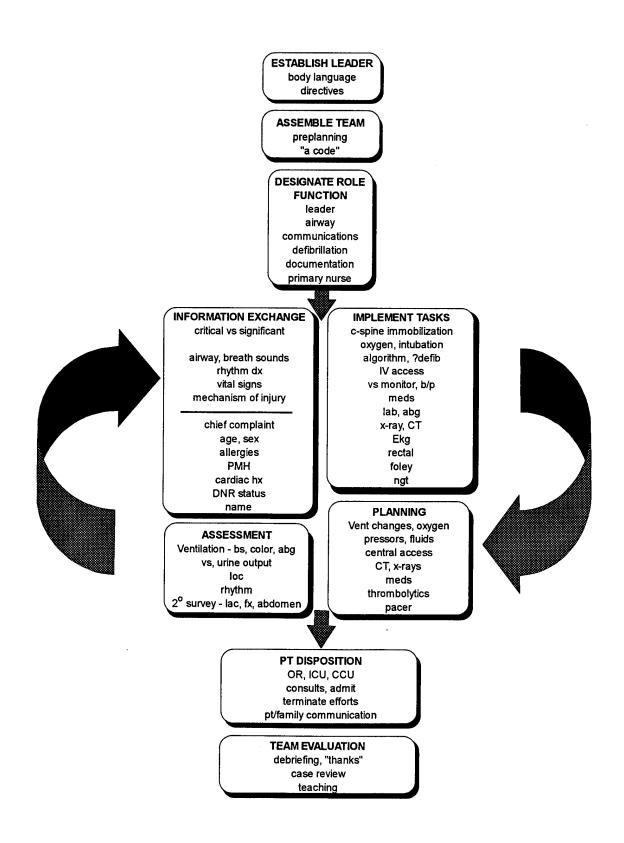debriefing, "thanks"
case review
teaching

Figure 3. Clinical team performance model - critical care.

share the same overall structure with the critical care model but differ with respect to the specifics of clinical activities (e.g., issues in pediatric assessment differ from those with other presentations).

The model illustrates the clinical team performance that directly focuses on patient care. Establishing the leader is the starting point for the team process. Team members recognize the physician as clinical team leader with ultimate clinical responsibility for patient care. Leadership, however, can be situationally assumed by another team member as the circumstances require.

Team assembly and role designation are the team processes that maximize team organization and the team's ability to preplan and utilize resources. Formed teams facilitate access to information and interventions.

Information exchange, task implementation, assessment, and planning are routines that are common to medical practice. The circular path suggests that each phase of the process is revisited as the patient's condition warrants. The completion of tasks generates information. When that information is clear, concise, and properly directed, decision making and planning are most accurate.

Patient disposition marks the exit path from the clinical team performance model. Activating the disposition process as soon as possible in the clinical scenario benefits both the patient and the ED with its limited resources and unpredictable census.

Team evaluation is the termination point of the model. Feedback, support, and teaching foster improvement in individual skills and overall team performance.

Emergency Team Coordination Course Curriculum™

The Emergency Team Coordination Course (ETCC™) curriculum was designed using the five TDs as a framework. Each TD is presented in a one-hour module. The primary descriptors (Table 6) were used to guide content development. In this way, course content is directly linked to the behaviors specified as measures of team effectiveness (i.e., the BARS in Appendix A). This evaluation-to-course content link is called evaluation-driven curriculum. Each module in the curriculum follows a standard format that includes:

- A list of learning objectives for the module

- A description of the scope of the module's content, which may include specific behavioral guidelines

- Key teaching points relative to the TD and its significance to ED practice

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- Clinical vignettes or practical exercises designed to enhance understanding of the material

- Performance criteria that can be used to assess team effectiveness with respect to the TD

- A Team Challenge designed to help the team implement a change in the workplace with respect to the TD

The curriculum also contains three practicums based on clinical scenarios. The curriculum modules and practicum are summarized in the following sections.

Introduction to the Course

The ETCC™ begins with an introduction that justifies the need for teams and teamwork in the healthcare environment. The curriculum continues with a discussion of four elements that distinguish work teams from work groups. The five TDs are introduced as categories of observable team behaviors that are used to measure team performance. The introduction concludes with the linkage of team performance (macro-level behavior) with clinical practice (micro-level behavior) through presentation of the Clinical Team Performance Model.

Team Dimension I: Maintain Team Structure and Climate

The scope of this TD encompasses three components: team structure and roles, team formation, and team climate.

The first component of this module, team structure and roles, addresses ED composition and defines the Primary Care Team. It also describes the Designated Team Leader, Situational Leader, and Follower roles. The second component of the module, team formation, includes guidelines for assembling the team and a presentation of several ED team organizational models for consideration. The final component highlights the characteristics of team climate and includes a strategy for managing conflicts that arise within the team.

Team Dimension II: Apply Problem Solving Strategies

This module addresses planning and decision making as central teamwork tasks associated with performing clinical tasks. Two forms of planning are presented: long-term (e.g., policies and procedures) and situational. Four forms of decision making are presented from the perspective of the decision maker's information needs. Also included are the forms of decision-making error that may occur. The role of the team in supporting the decision maker with information to facilitate decision making and with cross-monitoring to reduce decision-making errors is addressed. The techniques of advocacy and assertion are introduced as techniques to enhance the communication process associated with planning and decision making.

Team Dimension III: Execute Plans and Manage Workload

This module addresses workload comfort and provides several strategies for managing work underload and overload, including delegation, prioritization and triage, resource management, situation awareness, and cross-monitoring.

Rather than focusing on the typical vertical process found in traditional hierarchical systems, delegation is presented as a "lateral" activity; that is, an activity that occurs between teams, and also among members of a team. Prioritization is described on two levels: task priority and patient priority. Likewise, a distinction is made between primary and secondary triage. This portion of the curriculum includes a review of triage classifications and is supported by several clinical examples.

Course content concerning resource management highlights several examples of how to effectively manage workload. Strategies are further reinforced through a clinical vignette and practical group exercise.

Situation awareness is defined and discussed with reference to three levels: the individual patient, the team, and the ED. Factors that enhance or degrade situation awareness are presented along with a guided question for participants that encourages them to consider how situation awareness is established in their own work environment.

Finally, cross-monitoring is presented as a workload management strategy that is a natural extension of situation awareness. The method is presented in a manner intended to reduce the threat associated with its label and focuses on its value as a "safety net" used to avoid or correct an error chain before there is an adverse effect.

Team Dimension IV: Support Team with Information and Actions

The next module of instruction addresses the quality of information exchange within the team. It addresses the practice of offering and requesting support and describes the significance of keeping the team informed of decisions and actions that impact their practice and clinical outcomes. Support is described in terms of information exchange and task assistance.

The primary focus of the module is information exchange. A list of common problems associated with this form of support is provided along with a review of factors that influence negative outcomes. The distinction is made between "critical" and "significant" information and their implications in clinical practice. Examples are provided to enhance understanding.

Four quality standards for useful communication are presented followed by guidelines for "getting good information from others" and "giving useful information to others."

The last point addressed in this module is the communication of decisions and actions, which focuses on the importance of announcing, acknowledging, and documenting actions.

The focus then shifts to task assistance as a form of support. This portion of the curriculum begins with a list of basic team commitments concerning this behavior and concludes with a list of techniques that enhance task assistance.

Team Dimension V: Improve Team Skills

The final module addresses the issue of skill improvement through coaching, situational learning, and team performance review. Complementary skills, performance goals, and mutual accountability are presented as the building blocks of team performance. Performance feedback is described in terms of its benefit to the team. Characteristics of effective feedback are described and exemplified.

Team performance review is presented in two formats: formal and informal. Methods of formal review include clinical case review and team performance review. Informal reviews are presented as having great appeal in that they are situationally driven and occur in real time. Lastly, barriers to using a review system are presented.

Clinical Practicums

At the conclusion of the didactic portion of the course a practicum exercise is introduced. This portion of the curriculum provides an opportunity for class participants to integrate team behaviors into clinical practice. Course participants are assigned to groups of six to eight. Each group participates in two clinical scenario simulations. The simulations are designed in detail and supported with resuscitation manikins, technical equipment, instruments and supplies, and patient monitors operating in simulation mode. Roles are assigned and some of the interactions are scripted. The exercises are videotaped and facilitated by an instructor. Feedback is delivered at the conclusion of the practicum using videotapes and an after-action review guide.

Evaluation Instruments

The measurement instruments used to assess the effectiveness of the team training program were designed to collect both objective performance data (i.e., data reflecting the operational performance of the ED) and subjective data (attitudes and satisfaction ratings) from hospital staff and patients. The variety of measurement instruments used is shown in Table 7. Our

Table 7

Measures Used for Assessment of ED Team Training

Measurement area	Candidate measures
Attitude	• Staff satisfaction: DRC-developed measure of job satisfaction • Patient satisfaction: Parkside Associates Quality of Care Monitor
Behavior	• Behaviorally Anchored Rating Scale: Core Staff Team Performance Rating Form. DRC-developed criterion-referenced observation instrument based on five emergency team dimensions. Teams rated on a seven-point scale with behavioral anchors at the 7, 4, and 1 (superior, acceptable, and very poor) levels • Individual staff coaching: Coaching Evaluation Questionnaire
Performance	• Patient throughput time measures (time and efficiency) • Patient outcome: Admission Evaluation Survey

measurement philosophy is to conduct a broad assessment of the impact of the teamwork training by examining changes in staff and patient attitudes, the behavior of teams, and the operational performance of the ED. It is unlikely that one type of measure will provide sufficient evidence of the course's efficacy, but collectively the measures will provide a comprehensive, multi-faceted account of its effectiveness.

DRC developed all the measurement instruments with the exception of the patient satisfaction survey. The goal was to create instruments that could be used in a wide variety of hospitals. However, operational features and the medical record system at the curriculum tryout site, Lowell General Hospital (LGH) in Lowell, Massachusetts, dictated some of the content of the instruments. The details are presented in later descriptions of the instruments.

The data collection plan specified that pretraining data would be collected during the 30 days prior to the presentation of the course. Posttraining data would be collected during a similar period after the ED staff had participated in the course and completed other training activities. The same instruments would be used for both data collection phases.

Objective performance data consisted primarily of the times recorded in medical records at which significant patient assessment and treatment activities occurred. The quality of patients' preparation for admission to the hospital from the ED was assessed by in-patient staff nurses who received the patients. ED staff members' satisfaction with their working environment and their assessment of the level of teamwork in the ED was addressed in a staff satisfaction survey. Patient satisfaction was assessed with a commercial patient satisfaction survey. The level of teamwork was assessed for the three ED staffing shifts using the BARS (Appendix A). And finally, assessment of individual coaching as a means of implementing the team concept in EDs was assessed with a coaching evaluation form.

A brief description of each instrument is provided below. Table 8 summarizes administration features of the data collection instruments.

Staff Satisfaction Survey

The staff satisfaction survey, shown in Appendix B, consisted of six sections. A series of questions asked for information on professional experience. Each of five subsequent sections asked for ratings about one aspect of teamwork with respect to the rater's work shift. Questions were based on the team dimensions of (a) maintaining team structure and climate, (b) applying problem solving techniques, (c) executing plans and distributing workload, (d) supporting the team with information and actions, and (e) improving team skills. Each of these TDs is described in Appendix A. The final section asked for ratings of personal job satisfaction. A total of 64 questions required rating on a seven-point scale.

Patient Satisfaction

During a three-week period in the pretraining phase of DRC's data collection, LGH was participating in a nationwide survey of ED patient satisfaction using a survey and feedback program developed by Parkside Associates, Inc. Feedback consisted of a descriptive summary of the Lowell General Hospital respondent data, and a comparison of that data with similar hospitals participating in the program. Because the survey instrument is copyrighted material, it is not reproduced in this report. Questions asked for ratings on perceptions of (a) competency of the staff, (b) waiting time, (c) physical plant, (d) quality of care, (e) staff courtesy, and (f) adequacy of discharge instructions. Also included in the survey were demographic questions and two open-ended questions on the ED's service.

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Table 8

Summary of Data Collection Instruments

Measure	When	Who collected	Notes
Staff satisfaction	Pre-training	Distribution by ED Nurse Manager	Completed questionnaires returned by direct mail to DRC
	Post-training	Distribution by ED Nurse Manager	Completed questionnaires returned by direct mail to DRC
Patient satisfaction	Pre-training	Hospital	Hospital programmed effort
	Post-training	Hospital	DRC contracted for questionnaires and data summary
Team performance	Pre-training	DRC provides rating form to rater	ED Nurse Manager rates teams
	Post-training	DRC provides rating form to rater	ED Nurse Manager rates teams
Coaching evaluation	Post-training	DRC	Participants in individual team performance coaching sessions
ED through-put times	Pre-training	DRC	Patient medical records held in ED for 1-2 days before being sent to Medical Records
	Post-training	DRC	
Admission evaluation	Pre-training	Distribution by ED	Return to DRC via ED
	Post-training	Distribution by ED	Return to DRC via ED

Core Staff Team Performance Rating Form

To assess the ED's level of teamwork, a rating form for use by ED managers, or if a teaching hospital, a clinical supervisor, was developed. This form is shown in Appendix C. The rating form asks the manager to define a stable core of personnel who work a particular shift. Once identified, this core staff is rated on a seven-point scale using the five TDs. The description of the TDs (included in Appendix A) accompanied the rating form.

Coaching Evaluation Questionnaire

DRC provided nurses and physicians the opportunity for one-on-one coaching experiences during their shifts. That is, a DRC team project staff member would accompany an ED staff member performing normal duties and offer feedback and suggestions for implementing the TDs. After completing a coaching session, the ED staff member was asked to complete a coaching evaluation questionnaire shown in Appendix D. This instrument provides DRC feedback for refining coaching as a training tool.

Patient Throughput Time Measures

The implementation of teamwork principles in the ED should result in reductions in the amount of time required for various stages of a patient's assessment and treatment. Assessments of throughput (elapsed) times were made using critical times recorded in the patient's medical record. These critical times were registration time, triage time, time of administration of medications, times associated with nursing interventions, and discharge time. Other information obtained from the medical records were the date and day of visit, the numbers of x-rays and laboratory tests performed, and the patient's severity of illness. Each of the data elements, shown in Table E-1, were obtained from a sample of medical records.

Admission Evaluation Survey

DRC developed an 18-item survey instrument to assess whether patients admitted to the hospital through the ED had been adequately prepared for admission. The initial draft of the survey is shown in Figure F-1. Some questions asked if specific clinical activities were performed. Other questions related to administrative activities. After review by the LGH management, we developed a shorter version of the survey. This form, shown in Figure F-2, was inserted into the medical record accompanying the admitted patient. Once the patient was admitted to an in-patient service, the primary care nurse completed the form.

ETCC™ Curriculum and Evaluation Tryout

A trial presentation of the ETCC™ curriculum and an initial application of the evaluation instruments was conducted at LGH in the Fall of 1994. The Department of Emergency Services operates a Level II trauma center with approximately 37,000 patient visits a year. It is staffed with 33 registered and licensed practical nurses and aides, and 7 full-time equivalent physicians. Course participation by nurses, aides, and physicians was strongly encouraged by the Department of Emergency Services management, but was not mandatory. One indication of LGH's support for the training was that staff was paid for their participation. The academic portion of the course was taught on September 27 to 8 nurses and aides and 2 physicians, and on September 29, to 10 nurses and aides and 1 physician. On October 28, a combination lecture and detailed discussion of the course was conducted with

two physicians who had been unavailable for earlier classes. The course provided seven continuing education units for nurses awarded through LGH's Department of Nursing Education. The curriculum tryout, data gathering activities, and follow-up consultation sessions are discussed in the following sections.

Curriculum and Practicum Tryout

The schedule for the full-course training days is presented in Table 9. Approximately one hour was devoted to each of the Emergency TDs presented in lecture and discussion format. The morning session covered four of the dimensions. For the afternoon session, the class was split such that half the nurses and aides formed Group A with one physician and the remainder formed Group B[2] with another physician. Group A continued with the classroom presentation of TD 5, while Group B participated in the practicum in a separate room. The groups then exchanged training activities. The entire class reconvened at the end of the day for a review of practicum videotapes and instructor feedback.

Data Collection Tryout

Thirty days prior to the first course presentation, measurement of baseline patient throughput measures began. Data was collected on 17 days during the month. Every fourth patient medical record was sampled, and all available data elements (see Table B-1) for each record were recorded. Data from approximately 25 records were recorded for each day to yield a total of 411 records of throughput data.

During the same month, 250 copies of the Admission Evaluation Form (Figure C-2) were included in the medical records of patients admitted to the hospital. One hundred thirty-two completed forms were received for a return rate of 53%. The staff satisfaction survey distributed during the same period yielded a return rate of 50%. The Department of Emergency Services also mailed 900 patient satisfaction surveys to patients and obtained summary data from 215 completed surveys for a response rate of 24%. One of the two department managers asked to complete the Core Staff Rating Form (Appendix E) completed the form. The coaching evaluation form was not used.

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[2] A DRC consulting physician familiar with the ETCC™ team philosophy and curriculum served as a practicum group physician for the September 29th class since only one LGH physician attended the class.

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Table 9

ETCC™ Class Schedule

Time			Activity
7:30	-	8:30	Coffee
8:00	-	8:30	Introduction
8:30	-	9:30	Module I
9:30	-	10:30	Module II
10:30	-	10:45	Break
10:45	-	11:45	Module III
11:45	-	12:45	Module IV
12:45	-	1:30	Lunch
1:30	-	2:20	Group A Module V Group B Practicum
2:30	-	3:20	Group B Module V Group A Practicum
3:30	-	4:30	After-Action Review Wrap-up

Posttraining data collection was conducted during January 1995. Patient throughput measures were obtained from 414 medical records sampled on 14 days using the pretraining sampling method. An additional 250 Admission Evaluation Forms were distributed in the charts of ED patients admitted to the hospital. The staff satisfaction survey was distributed to 35 staff members. A set of 900 patient satisfaction surveys was mailed to discharged ED patients. The Core Staff Rating Form was not administered.

Follow-up Sessions

Three forms of post classroom consultation were offered to the Department of Emergency Services: coaching, critical event review, and shift coordinator consultations. These activities were designed to provide (a) additional support for course participants as they worked to implement the course content into daily operations, and (b) opportunities for practice and feedback on newly acquired teamwork skills. These consultations were planned to benefit LGH in transitioning to a team structure and provided valuable insights to the project team on the operational, managerial and interpersonal

consequences of team concepts applied to a community hospital ED. The consultations were surrogates for the practice and feedback environment of the aviators' full-mission simulators.

Coaching

The first form of consultation was one-on-one coaching for nurse and physician volunteers who had completed the course. The purpose of coaching was to provide specific guidance to ED staff on implementing the teamwork principles and behaviors taught in the course. The plan was for an ETCC™ project registered nurse or psychologist to shadow a staff member for one to two hours while he or she was on duty. Either during the observation period or afterward the coach would offer guidance or feedback. Although five nurses and one physician volunteered for coaching, all subsequently declined the opportunity.

Critical Event Review

A second form of consultation was a case review of a clinical event that had presented a problem in assessment, treatment, or disposition. The purpose was to take a recent situation familiar to ED staff and analyze the teamwork strengths and weaknesses of the event. A physician volunteered to write a narrative of such an event using the guidance provided in Appendix G . An ETCC™ project registered nurse supplemented the narrative with teamwork indicators using the format shown in Table G-1. Although this technique could have been presented as a stand-alone team review, it was incorporated into a shift coordinator consultation described later.

During the critical events review, DRC provided those present with Table G-1. The scenario narrative appears in column 1 of the table. Clinical actions, micro-behaviors corresponding to the team performance model, were listed in column 2. Column 3 provided a reference to macro-behaviors (i.e., the TDs). The staff read the narrative portion of the scenario. Next, the ETCC™ nurse facilitator engaged the staff in dialogue cross-referencing the team behaviors to corresponding points in the Clinical Team Performance Model.

This structured approach provided the participants insights in how team behavior impacts the patient process. It appeared that both physicians and nurses could be challenged by questions that referenced teamwork failures related to a specific event. Individuals became more aware of their accountability in team performance support. Evaluation seemed less threatening when many conflicts could be traced to limitations of leadership, information exchange, situation awareness, and resource management. This set the stage for a collaborative effort among all the participants in designing solutions to team/system problems identified in the critical event.

Shift Coordinator Consultations

The third form of consultation was a series of four meetings with ED staff nurses who recently had been assigned as shift coordinators. This position encompasses the responsibilities in operational management normally associated with charge nurses. Three physicians joined the meetings as their schedules permitted. All participants had completed the academic training. The purpose of each meeting (lasting from one and a half to two hours) was to review one of the team dimensions and discuss ways to implement it. Significant issues and suggestions or actions by the ETCC™ team consultants are shown in Table 10.

The shift coordinator consultations at LGH provided the most valuable method for post-classroom introduction of the team concepts and processes into the ED. As is the case within any team effort, establishing leadership and a supportive environment to spearhead the change to a team structure emerged as the important first step. A regular forum that invited both shift coordinators and physicians provided ETCC™ facilitators direct access to frontline leadership staff. Encouragement and support of their efforts to integrate the team concept assisted them in becoming "firm believers" in the importance of teamwork in the ED. Subsequently, they provided a powerful influence over others in the department. Once acknowledged as "believers," they as "insiders" were able to set expectations and hold other staff accountable. Collectively, as frontline department leadership, they displayed a strong commitment to focus efforts towards team improvement.

Summary and Recommendations

Summary

Following the lead of business and the military, health care professionals are beginning to focus on training teamwork skills as a means of improving organizational performance. An example of this type of training development from business is the airline industry's adoption of team training for aircrews, implemented in programs referred to as cockpit resource management (CRM) for improving safety and performance. In an effort parallel to that in commercial aviation, the U.S. Army recently implemented crew coordination training for its aviators using a curriculum and evaluation methodology developed by DRC. The success of that program prompted the Army to examine transferring the aviation training technology to other operational settings. One setting is the hospital ED, which shares several features with the aviation environment. These similarities include a high stakes, stressful environment characterized by abrupt transitions in workload, dynamic decision making, recurring planning cycles, and high levels of coordination and communication required among technically proficient personnel.

Table 10

Shift Coordinator Consultation Issues and Consultation Remedy

Team implementation issues	Consultation remedy
Obstacles to team structure	
Skepticism among leaders (shift coordinators, physicians, clinical director).	Acknowledged skepticism as a common response in early stages of team development. Reassured group that this will gradually give way to inter-group trust.
Recent experience with a Customer Service training program that was viewed as "soft" and difficult to operationalize.	Reinforced the practical application of team dimensions in clinical practice. Made consultation sessions outcome-oriented. Structured meetings to build in practical "leadership assignments" (reflective of ETCC^{TM} Team Challenges). Set expectation that members will report on progress in next meeting and subsequent follow through.
An assumption among nurses that physicians would not support or participate in the change.	Reported on separate meeting with physicians in which they communicated their interest in participating in this team effort. Ensured that meetings included both nurses and physicians. Raised and resolved issue of leadership "buy-in" at first joint meeting.
Initial resistance of clinical leaders to critical event review due to fear of exposure and criticism.	Developed "Guidelines for Critical Incident Review" that include ground-rules that reduce the threat associated with this activity.
Difficulty in coordinating meeting times of group with varied schedules.	Rotated meeting times from 8:00 AM to 5:00 PM to straddle two shifts and maximize attendance.
Obstacles to team process	
Strong resistance of charge nurse on day shift resulted in non-compliance of day staff with change effort.	Confrontation by other clinical leaders did not change behavior. This became an administrative issue requiring clear communication of expectations and transfer of accountability by the Nurse Manager.
Inconsistencies in follow-through between shifts.	Discussed in consultation forums, resulting in team problem solving and development of a plan to minimize inconsistencies.
Perception of clinical leaders that change effort lacked administrative support. This conclusion was derived from the observation that resistors were not being held accountable for compliance with team model.	Involved ED administrators in consultation session to discuss needs of frontline leaders regarding administrative support during change effort.
Lack of administrative support (described above) reinforcing apathy and lack of motivation for change among some clinical leaders.	Should resolve with successful implementation of ED administrators' support.

The feasibility of applying the principles and training methods of the Army aviation program began with examining evidence for team errors in emergency medicine. Available malpractice data suggested that information management, coordination among professionals, and cross-monitoring among care givers appear to be sources of potential error. Although DRC's on-site observation of ED operations was not solely focused on gathering evidence of team errors, significant examples of team errors in team formation, communications, workload management, and other areas were noted. These observations, together with the malpractice data, confirmed that a preliminary trial in improving ED teamwork was warranted.

DRC developed the Emergency Team Coordination Course™ in response to the need to reduce common teamwork errors, avoid risk, and to improve teamwork performance in military and civilian EDs. Because the on-site observations did not suggest an entirely new curriculum developmental effort was necessary, DRC adapted the team concept and organizing principles from the aviation domain (i.e., the aviation Crew Coordination Basic Qualities) to accommodate the specific ED operational features and requirements. The resulting five TDs formed the organizing structure for both the behavioral descriptions of superior, acceptable, and very poor team ratings and the curriculum. To evaluate the impact of the training, DRC also developed a suite of evaluation instruments measuring staff and patient satisfaction, team behaviors, and ED performance.

The training package included classroom lecture, discussion, and practicum sessions, which subsequently were augmented with staff consultations. These activities were delivered as a proof-of-concept intervention. That is, the intent was to test the feasibility and appropriateness of the curriculum content for the target audience and training time allowed. Application of the data collection instruments was likewise viewed as a pilot test to reveal the administrative requirements for a variety of subjective and objective instruments. Five physicians and 18 nurses and aides received the training; data gathering activities exercised each of the measurement instruments.

Described in the following sections are conclusions and recommendations drawn from the curriculum and evaluation try-outs. Recommendations for further research and development are provided in the final section.

Conclusions and Recommendations

Our analyses suggested that teamwork errors are implicated to some degree in emergency medicine malpractice. Moreover, teamwork is not taught as part of courses such as the Advanced Trauma Life Support that credential professionals in emergency critical care procedures. In fact, none of the EDs used for observations in this project reported any form of team

training. Together, these findings point to a teamwork training requirement for ED teams.

The principles of effective teamwork comprising DRC's Army aircrew coordination training were readily transferred into the domain of ED teams. Specific teamwork needs such as situational learning and shared leadership reflecting the operational and clinical requirements of an ED were accommodated in the revised Emergency TDs. Likewise, observational data and the experience of DRC's project staff led to a comprehensive description of superior, acceptable, and very poor ED team behaviors contained in the BARS. The curriculum was developed from these well-defined constructs.

The ETCC™ retained many of the features of the didactic and practicum training approaches used in the aviation program, a format well received by the participants and found to be highly effective. After three run-throughs of the material, the instructors evaluated the course content and structure. The major conclusion is that the ETCC™ offers a significant contribution toward meeting the need for improving efficiency and enhancing the quality of emergency care. Further development of the ETCC™ should consider the following conclusions:

- Each hour-long module should contain numerous clinical vignettes to illustrate commonplace problems in clinical situations traceable to teamwork issues.

- A separate module that provides a detailed examination of the Clinical Team Performance Model and work-through examples, such as the one used in the critical event consultation, may be an effective alternative to the simulation-based practicum.

- The course material can be covered in one eight-hour training day if the practicum is eliminated from the academic day.

- The videotaping support and medical equipment requirements to conduct practicum sessions are a considerable logistical burden.

- Practicum sessions lasting approximately two hours do not permit sufficient time for participants to practice team behaviors and receive comprehensive feedback.

- Practice and feedback are important elements of the training. Aviators have high-fidelity simulators available that can be used for this purpose. Simulators in medicine are either low-fidelity or too expensive to be of practical value for teamwork training. Methods for providing practice and feedback in teamwork have to be refined and carefully incorporated into the ETCC™.

- More practical exercises should be incorporated into the academic portion of the course. For example, participants should have opportunities to practice information transfer in high, medium, and low time stress situations.

- Because the written patient record is a principal form of intra-team communication, a practical exercise on terminology used in documentation needs to be constructed and incorporated into the training.

- A medical corollary to Army aviation's "two-challenge" rule needs to be incorporated into the training.

- Communication "rules" need to be considered for incorporation. For example, misunderstanding of verbal orders is a common problem. Just as is done in aviation, the ETCC™ should teach participants that all verbal orders are "read back" to the sender to confirm receipt of the proper order.

- Video examples of good and bad teamwork need to be developed and incorporated into the training.

- Continuing education credits for physicians, nurses, and technicians should include a requirement for a specific number of hours for structured practice and feedback beyond the classroom. Credit hours should be adjusted to reflect the practice and feedback requirement.

The objective and subjective assessment instruments were shown to be usable as designed, and presented few problems with respect to time required for collection or user acceptance. The tryout demonstrated that it is possible to obtain a variety of measures from ED records, hospital staff, and ED patients. Assiduous efforts at follow-up on surveys can be used to improve response rates. Analysis of the data from each instrument will reveal possible changes in the instruments to improve validity. Other methodology improvements may be helpful. For instance, patient records are not standardized across hospitals. Patient records in one ED may contain a rich source of times associated with evaluation, diagnosis, and treatment. These data may be supplemented by computer-based records such as laboratory test times and indexes of professional time expended by ED staff. Other hospitals, in contrast, may require fewer times to be recorded or have little or no supplemental data to offer from automated systems. The experience from the tryout has provided guidelines for the desirable types of ED performance data and methods for their collection.

Another area that needs careful consideration is how to best apply the behavioral anchored ratings of the TDs. Raters need to be carefully trained and units of analysis (i.e., what subset of staff comprises a team, what type of events, and in what time frame are ratings applied) need to be considered.

The consultation efforts that followed the classroom instruction highlighted the need for high level administrative support essential for the team building processes to begin and be sustained. Both executive managers and frontline supervisors must be committed to the program to facilitate the process and hold each staff member accountable for implementing the team principles and practices. This conclusion is not unique to this project, and appears to operate in any efforts at organizational change. In addition, experience in the ED setting reinforces an implementation principal found in our aviation crew coordination program. That is, the best means of implementing and sustaining the team approach will be to train members of the ED staff as trainers for the program, who will then serve as implementers and evaluators of team behavior. This is a better approach than using outside consultants or trainers. In short, unless the institution "owns" the program and it is clearly a priority of the ED leadership, the program will not succeed.

Future Research and Development

The first year's research, although successful beyond our initial expectations, leaves some important questions unanswered. Follow-on research and development should consider the following areas:

• The costs of not doing good teamwork need to be understood. Costs should be calculated in terms of exposure to litigation and its associated costs and in terms of department efficiency. It would be most interesting to construct a method for understanding the relationship between patient satisfaction and revenue and/or litigation costs. Emergency health care would benefit from this because patient satisfaction questionnaires are widely used but have no research base to support their popularity. It would also be worthwhile to link staff satisfaction scores with quality and quantity of care.

• The assertion that DRC makes in terms of the efficacy of the ETCC^{TM} needs to be validated. After the training and evaluation are rewritten, a full-scale validation needs to be constructed and implemented. Before the emergency medical community can be expected to make a training investment of this magnitude, they should know precisely the actual costs and expected benefits.

• In our estimation, some hospital EDs would not benefit from the team training. For instance, if any of the following conditions are present, we hypothesize a reduced benefit from the training: leadership turbulence, union problems, physical plant renovations, high-turnover staffing patterns, etc. These effects need to be understood and a "teamwork readiness" questionnaire needs to be developed to assess whether a department would benefit from making the training investment.

- It is expected that the teamwork training and evaluation methodology developed by the Army and DRC has applicability to other environments. For instance, the military would benefit from this training if it were applied to Mobile Army Surgical Hospital (MASH) teams. Likewise, a civilian corollary to MASH units, Disaster Medical Assistance Teams that are run by the Federal Emergency Management Agency would also benefit.

- During our observations, an ergonomics problem became obvious. The problem is that there is no system integrator for emergency medicine environments. Thus, resuscitation rooms, the high-tech areas where seriously ill or injured patients are brought upon arrival to EDs, are a collection of parts (medicines, IVs, needles, surgical instruments, monitors, oxygen delivery systems, EKG equipment, pulse oximeter, portable x-ray machines, electrical cords, gas tubes, etc.) instead of an integrated whole. The military knows how to do the engineering and human factors work that is necessary for systems integration. Ways to apply this expertise to emergency medicine should be explored.

References

Adams, A. B. (1990). Productivity through team building. Journal of Postgraduate Anesthesia Nursing, 5(2), 117-119.

American College of Surgeons Committee on Trauma (1988). Advanced trauma life support course. Chicago, IL: American College of Surgeons.

Chopra, V., Bovill, J. G., Spierdijk, J., & Koornneef, F. (1992). Reported significant observations during anaesthesia: A prospective analysis over an 18-month period. British Journal of Anaesthesia, 68, 13-17.

Cohen, M. H., & Ross, M. E. (1982). Team building: A strategy for unit cohesiveness. Journal of Nursing Administration, 12(1), 29-34.

Cornett-Cook, P., & Dias, K. (1984). Teambuilding: Getting it all together. Nursing Management, 15(5), 16-17.

Drexler, A., Yenny, S. L., & Hohman, J. (1977). OD team building: What it's all about. Hospitals, Journal of the American Hospital Association, 51(2), 99-102.

Emergency Cardiac Care Committee and Subcommittees, American Heart Association. (1992). Guidelines for cardiopulmonary resuscitation and emergency cardiac care, I: Introduction. Journal of American Medical Association, 268(16), 2172-2183.

Ewell, M. G., & Adams, R. J. (1993). Aviation psychology, group dynamics and human performance issues in anesthesiology. In R. S. Jensen & D. Neumeister (Eds.), Proceedings of the Seventh International Symposium in Aviation Psychology (pp. 499-504). Columbus, OH: The Ohio State University Department of Aviation.

Farley, M. J., & Stoner, M. H. (1989). The nurse executive and interdisciplinary team building. Nursing Administration Quarterly, 13(2), 24-30.

Fleishman E. A., & Zaccaro, S. J. (1992). Toward a taxonomy of team performance functions. In R. W. Swezey & E. Salas, Teams: Their training and performance (pp. 31-56). Norwood, NJ: Ablex.

Gardner-Bonneau, D. J. (1993) What is iatrogenics, and why don't ergonomists know? Ergonomics in Design, July, 18-20.

Glickman, A. S., Zimmer, S., Montero, R. C., Guerette, P. J., Campbell, W. J., Morgan, B. B., Jr., & Salas, E. (1987). The evolution of teamwork skills: An emprical assessment with implications for training. Orlando, FL: Naval Training Systems Center. (DTIC No. AD-A198 075)

Grubb, G., Leedom, D. K., & Simon, R. (1993). Development of candidate crew coordination evaluation methods and materials (Technical Report E-21867U). Wilmington, MA: Dynamics Research Corporation.

Grubb, G., Simon, R., & Zeller, J. (1992). Aircrew coordination exportable evaluation package for Army aviation. Wilmington, MA: Dynamics Research Corporation.

Halstead, L. S., Rintala, D. H., Kanellos, M., Griffin, B., Higgins, L., Rheinecker, S., Whiteside, W., & Healy, J. E. (1986). The innovative rehabilitation team: An experiment in team building. Archives of Physical Medicine and Rehabilitation, 67(6), 357-361.

Helmreich, R. L., & Schaefer, H. G. (1994). Team performance in the operating room. In M. S. Bogner (Ed.), Human Error in Medicine (pp. 225-253). Hillsdale, NJ: Erlbaum.

Howard, S. K., Gaba, D. M., Fish, K. J., Yang, G., Sarnquist, F. H. (1992). Anesthesia crisis resource management training: Teaching anesthesiologists to handle critical incidents. Aviation, Space, and Environmental Medicine, 63(9), 763-770.

Klepcyk, J. C. (1990). Team building: Technique for strengthening the pharmacy team. Topics in Hospital Pharmacy Management, 10(1), 65-75.

Leape, L. L. (1994). The preventability of medical injury. In M. S. Bogner (Ed.), Human error in medicine (pp. 13-25). Hillsdale, NJ: Erlbaum.

Leedom, D. K., & Simon, R. (in press). Improving team coordination: A case for behavior-based training instead of intrateam familiarity. Military Psychology.

Miles, M. B., & Schmuck, R. A. (1989). In W. L. French, C. H. Bell, & R. A. Zawacki (Eds.), Organizational development: Theory, practice, and research (pp. 37-40). Homewood, IL: BPI-Irwin.

Oser, R., McCallum, G. A., Salas, E., & Morgan, B. B., Jr. (1989). Toward a definition of teamwork: An analysis of critical team behaviors. Orlando, FL: Naval Training Systems Center. (DTIC No. AD-A212 454)

Pawlik, E. A., Simon, R., Grubb, G., & Zeller. J. (1992). *Final aircrew coordination exportable training package* (Volumes 1, 2, & 3). Wilmington, MA: Dynamics Research Corporation.

Pawlik, E. A., Simon, R., Grubb, G., & Zeller, J. (1993). *Development of candidate crew coordination training methods and materials* (Technical Report E-21983U). Wilmington, MA: Dynamics Research Corporation.

Risk management in emergency medicine. (1990). Plainville, MA: Massachusetts College of Emergency Physicians.

Simon, R. (1990). *Development of measures of crew coordination* (Technical Report E-16870U). Wilmington, MA: Dynamics Research Corporation.

Simon, R. (1991). *Results of the data analysis: Army aircrew coordination measures testbed conducted Spring 1990* (Technical Report E-17639U). Wilmington, MA: Dynamics Research Corporation.

Simon, R. (1992). The crew coodination model. In E. A. Pawlik, R. Simon, G. Grubb, & J. Zeller, Final aircrew coordination exportable training package (Vol. 3, pp. G-17 - G-23). Wilminton, MA: Dynamics Research.

Simon, R., & Grubb, G. (1993). *Validation of crew training and evaluation methods for Army aviation* (Technical Report E-21922U). Wilmington, MA: Dynamics Research.

St. Paul Fire and Marine Insurance Company. (1989). *Top ten allegations: Emergency medicine physicians insured by St. Paul Fire and Marine Insurance Company, reported 1984 through 1988.* Minneapolis, MN: Author.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectiveness. *American Psychologist, 45*(2), 120-133.

Swezey, R. W., & Salas, E. (Eds.). (1992). *Teams: Their training and performance*. Norwood, NJ: Ablex.

Tannenbaum, S. I., Beard, R. L., & Salas, E. (1992). Team building and its influence on team effectiveness: An examination of conceptual and empirical developments. In K. Kellet, (Ed.), *Issues, theory, and research in industrial/organizational psychology.* Amsterdam, Holland: Elsevier.

Tannenbaum, S. I., & Yukl, G. (1992). Training and
    development in work organizations. <u>Annual Review of
    Psychology</u>, <u>43</u>, 399-441.

Trautlein, J. J., Lambert, R., & Miller, J. (1984).
    Malpractice in the emergency department - Review of 200
    cases. <u>Annals of Emergency Medicine</u>, <u>13</u>, 709-711.

Wiener, E. L., Helmreich, R. L., & Kanki, B. G. (Eds.).
    (1993). <u>Cockpit resource management</u>. San Diego:
    Academic Press.

Appendix A

Behaviorally Anchored Rating Scales (BARS) for the Emergency Team Dimensions

Emergency Team Dimension 1: Maintain Team Structure and Climate

This rating assesses the quality of professional relationships among physicians, nurses, and other personnel comprising the emergency team, and the overall interpersonal climate of the emergency department (ED). Team members acknowledge the essential team objective: provide the highest standard of patient-centered care. The team's goals are both patient-centered and task-centered with the focus on achieving both goals rather than on who specifically accomplishes them.

The team leader is the attending physician who has final authority in clinical matters. The senior attending physician sets the tone of the team and maintains a cooperative working environment by sharing or delegating authority and promoting the participation of all team members.

This rating also concerns the importance of the timely dissemination of information essential to team formation and coordination. Team formation consists of learning who is serving on the team and knowing each team member's responsibilities, becoming aware of the clinical status of the team's patients, and knowing the operational issues in the ED and elsewhere affecting overall operations. All team members communicate essential information through face-to-face contact or other means.

Because emergency treatment is a team effort, each member recognizes his or her own special skills, and acknowledges and appreciates the skills of other team members. Team members understand their interdependence and demonstrate a willingness to assume responsibility, act autonomously, and offer assistance to other team members. Team members assist each another in achieving the highest technical competence and advocating respect for patients and coworkers. While the physician has clear lines of clinical authority and responsibility, team leadership is flexible because situations may require any team member to assume situational leadership. Decisions are supported by the team even when there may not be complete agreement.

Superior Rating (7)

Each team member assumes responsibility for becoming aware of relevant clinical and operational issues. The attending physician and a nursing team member ensure that actions, duties, and task responsibilities are partitioned and clearly assigned to specific individuals. Questions and discussion about tasks and specific responsibilities are encouraged.

The team members have very good interpersonal relationships. They respect others' skills and appear to enjoy being with each other. There is a genuine concern for good working relationships. Team members go beyond common workplace courtesies

to express appreciation of other member's contributions and to reinforce good teamwork. No degrading comments or negative voice tones are used in interactions. The climate is very open; team members freely talk and ask questions. Team members encourage the individual with the most information about the situation-at-hand to participate. Disagreements are perceived as a normal part of team interactions, and the team directly confronts the issues over which the disagreement began. Arguments or disagreements focus on the specific situation behavior or solution rather than on personalities. Each team member carefully listens to others' comments. Senior team members accept challenges from junior team members. Alternative solutions are explored. The solution produced is a "win-win" situation in which all team members' opinions are considered. The team members have no hard feelings at the conclusion of the incident. Offers of assistance are freely given and appreciatively acknowledged. Each team member demonstrates patient-centered care attitudes. Team members monitor the attitudes of other team members and offer positive and negative feedback.

Acceptable Rating (4)

A brief description of the current ED status is provided to some or all team members. The attending physician and nursing team members ensure that task responsibilities are partitioned and assigned to specific individuals. Routine assignments are adequately covered, but contingencies for special situations are not carefully planned. One or more team members seeks necessary information during the course of organizing the team, but some team members remain less well informed than others.

The team members have sound interpersonal relationships and seem to respect one another's skills. However, staff members interact on clinical and operational issues in a business-like manner and engage in only limited socially-oriented interchanges. Although team members are courteous, the tone of interactions is formal and businesslike. The climate is an open one, and team members are free to talk and ask task-oriented questions. Regardless of rank, position, or professional status, individuals with information about the situation-at-hand are allowed to participate. When disagreements arise, the team directly confronts the issues over which the disagreements began. The primary focus is on behavior or solutions, and no personal attacks are made in the heat of discussion. The solution is generally seen as reasonable. Problem resolution ends on a positive note with very little hostility or grumbling among team members. Mutual respect is clearly intact. Team members generally remain focused on their assigned tasks, but assistance is offered as conditions allow. Obvious disregard of patient-centered attitudes is not apparent. Team members correct instances of improper patient-centered attitudes.

Very Poor Rating (1)

A team member provides some or all team members with essential work-related information with little or no attendant explanation. There is little or no discussion of responsibilities or their assignments to specific team members. Team members tend not to ask questions about the operations for their shift. If asked, questions tend to be cut off, only briefly addressed, or ignored by the other team members.

Team interactions are often awkward and uncomfortable. The team members do not appear to like or respect each other. Team members may be curt and impolite to each other. Requests for assistance are made as commands rather than as requests for support. When disagreements arise, the team fails to directly confront the issues. Personal attacks may arise. Senior team members are resistant to recommendations from junior team members. Team members do not explore the range of possible solutions. They may shout or argue without finding a solution. One or more team members may retreat and say nothing at all. A "win-lose" situation develops in which one team member is shown to be right and the other to be wrong. The team members show little respect to one another except for deferring to formal rank or professional status. Assistance may be withheld or provided only in cases of extreme need. Team members exhibit attitudes that may jeopardize patient welfare.

Emergency Team Dimension 2: Apply Problem-solving Strategies

This rating evaluates the team's ability to apply established algorithms, protocols, and other preplanned actions, and to demonstrate flexibility in modifying these or planning for emergent situations. In addition, the appropriateness of the team's selection of a decision-making process is rated. Another quality of problem solving evaluated in this dimension is the openness to contributions of information or ideas from team members.

The team engages in planning activities required for unusual situations in patient care, and carries out established routines and practices for anticipated clinical and administrative situations in the ED. Planning for unusual situations involves collecting essential information, identifying potential problems and courses of action, assessing risks, and determining required tasks and assigning specific responsibilities to each team member. Planning also may include mental rehearsal or practice of the anticipated course of action. Team members also implement department-wide plans, protocols, and algorithms covering routine operational and clinical situations.

Although the physician or situational leader is responsible for leading planning activities, evaluate the extent and manner in which the entire team participates. Also, consider the time constraints on the team. If there were insufficient time to conduct comprehensive planning and rehearsal, evaluate the team on its planning and rehearsal of the most critical segments of a significant situation. That is, either before the situation or while it was unfolding, did the team address the most important issues given the time available? Note: The relationship among team members should be observed during this period but the team climate evaluation should be made on rating Emergency Team Dimension 1, Maintain Team Structure and Climate.

Factors to consider in making an evaluation of decision-making include (a) information available to the team members, (b) time urgency of the decision, and (c) level of involvement and information exchange among the team members. The time critical demands of emergency treatment require many decisions to be made on an automatic, pattern-recognition basis with only a minimum level of information exchange. However, when adequate time and information are available, team members are expected to engage in a more deliberate and interactive style of decision making. The evaluation of team decision making performance should ask the following questions:

1. Did the team use all of the available information?

2. Was the type of decision process (automatic versus deliberate) appropriate for the time available?

3.   Was the level of information exchange among team members appropriate and sufficient?

Finally, this rating evaluates the extent to which team members advocate a course of action they consider best, even when it may differ with the one being followed or proposed. Note: Except under extreme conditions where time is absolutely critical, it is usually in the team's best interest to hear the full range of viewpoints available.

Superior Rating (7)

The team acquires new and updated information and uses it to develop or modify a plan of action. All actions, duties, and task responsibilities of a plan are partitioned and clearly assigned to specific individuals. Questions and discussion about the situation and specific responsibilities are encouraged. Potential problems are noted and discussed. Courses of action and individual responsibilities are established in the event that potential problems actually occur. The physician or situational leader leads the team in mentally rehearsing or practicing the plan by visualizing and talking the team through potential problems and contingencies. Team members acknowledge understanding their assigned responsibilities and cues for action.

Team decision making consistently reflects proper attention to available information. The level of team participation and deliberate analysis of options is appropriate for the decision time available. Resulting decisions are timely and appropriate given the time urgency and level of information available in each situation. Team members do not exhibit any hazardous thought patterns (i.e., anti-authority, impulsivity, invulnerability, resignation, overconfidence in other professionals) and appear motivated to seek the most effective, unbiased, and safe decision in each situation. The team decides and implements a course of action before the situation jeopardizes team performance or patient welfare.

Team members state to the rest of the team a course of action that they consider best. They clearly explain their reasons for believing this to be the best course. Other team members listen to the argument before presenting any criticism or proposing alternate courses. Discussions focus on the strengths and weaknesses of the proposed course of action, not on the professional status or personality of the team member who proposed the action. Other team members expect such open comments and view them as positive contributions to team performance.

Acceptable Rating (4)

A brief description of the situation is provided to the entire team. Responsibilities are partitioned and assigned to specific individuals. Actions are taken

to update current information that adds to the situation briefing and helps develop a plan. One or more team members makes comments during the course of developing a plan. Potential problems are only briefly discussed. There is adequate preparation for contingencies. Team members briefly discuss the operational risks in a plan. Mental rehearsal or practice is initiated by the physician or another team member who talks through potential problems or contingencies for one or more aspects of the intended action. Some discussion takes place to clarify responsibilities in the event of unexpected problems or contingencies.

Team decisions sometimes reflect a reluctance to share or use available information. Occasionally, team members dwell too long on some issues while neglecting more time urgent requirements. Most decisions are timely but on occasion are not well resolved or understood by the team. Most decisions are appropriate for the situation with the team occasionally overlooking one or more factors or options. Occasionally, team members do not recognize or exploit opportunities for additional planning or rehearsal, substituting *ad hoc* strategies or plans. Team members do not exhibit any hazardous thought patterns (i.e., anti-authority, impulsivity, invulnerability, resignation, overconfidence in other professionals) and avoid decision biases. The situation may worsen slightly without seriously degrading patient treatment before the team decides and implements a course of action.

Team members state their support for a course of action or suggest improvements to other proposed actions. Each team member makes an effort to explain his or her position and convince others to concur on the course of action to be taken. Other team members may counter with their views and alternatives. Team members usually speak out when they recognize a risky departure from standard procedures or when they have a piece of information that is important to another's task execution. Other team members view such comments as constructive and not as a challenge to authority.

Very Poor Rating (1)

The physician or situational leader briefs the situation with little or no attendant explanation. There is little or no discussion of specific team member responsibilities. Team members tend not to ask questions about the situation. If asked, questions tend to be cut off, only briefly addressed, or ignored by the other team members. Little or no mention is given to potential problems or complications. No team member says anything about operational risks or weaknesses in the plan. Any suggestion to talk through a potential problem or rehearse actions is rejected as unnecessary. Interactions are abrupt and impersonal.

Planning reflects an inflexible style of decision making (either deliberate or automatic) despite time urgency. Team members may engage in excessive deliberation, overlook the relative urgency of competing decision requirements, or act impulsively.

As a result, decisions frequently lack timeliness, ignore important factors, or appear out of context. Information exchange and team member interaction are minimal, so that critical input is ignored or not sought. Team members may display hazardous thought patterns (i.e., anti-authority, impulsivity, invulnerability, resignation, overconfidence in other professionals) or decision biases. The team may be unable to decide or implement a course of action before a situation becomes critical.

Except for the team leader, team members almost never suggest a course of action. Team members attempting to propose a course of action may be cut off before they can propose the action or explain the rationale for that action. Team members proposing courses of action may receive personal attacks. Team members may even fail to intervene when risks such as incorrect procedures or using faulty equipment arise.

Emergency Team Dimension 3: Execute Plans and Manage Workload

This rating concerns the adequacy of carrying out plans and protocols and managing changing levels of workload. The rating begins at the point where the team has chosen to carry out a routine treatment plan or protocol, or has completed planning activities required for an unusual situation in patient care. The effectiveness of carrying out the course of action for an individual patient and executing ongoing plans for all patients within the team's area of responsibility is the focus of this assessment.

One dimension of the rating is the attentiveness of the team to conducting secondary triage of its patients, and establishing new priorities for patient care. Reprioriatization is necessary as the conditions of patients change or new patients arrive who require higher levels of care. This periodic reassessment may require the team to reenter the decision and planning cycles for one or more patients.

Evaluate the effectiveness of time and work management. Rate the extent to which the team as a whole avoids being distracted from essential activities, perceives transitions in workload levels, distributes workload among team members, and avoids individual team member overload. Evaluate the team's performance under unusual circumstances that may involve high levels of stress. Assess the integration of technical and managerial strategies for contending with stressful and high workload situations. The delegation of task responsibilities among team members is one such strategy that should be considered in this rating. Another strategy is the prioritization of critical and noncritical duties.

Rate the extent to which the team uses cross-monitoring as a mechanism to avoid errors and reduce risk. Team members can catch each other's errors or risky behavior. Such redundancy is particularly important when teams are fatigued, stressed, or too focused on critical tasks.

Finally, include in this rating an evaluation of maintaining situational awareness. Rate the extent to which team members keep each other informed. Information reported includes the status of patients, team member welfare, and significant operational factors within the ED, such as equipment status and institutional conditions.

Superior Rating (7)

The team remains calm and imposes the maximum amount of control possible over the situation given the available time and internal and external resources. Each team member immediately takes on individual workload responsibilities based on prior discussions or rehearsal. Each member handles his or her own responsibilities and seeks to support the team member with the greatest workload. Team members are

aware of workload buildup on others and readjust workload by assuming emerging, unassigned tasks. Overloads do not occur.

Virtually all distractions are avoided. Each team member understands precisely what information is relevant to the situation and what information is simply a distraction. If a team member becomes mildly distracted, other team members remind him or her to focus on the task. Each team member is concerned that all tasks are properly executed and checks both his or her tasks and those of others. When mistakes are noted, the team member making the error is quickly informed in a concise manner without excessive formality. The person in error accepts this feedback as a normal part of team operations. All duties are prioritized and noncritical duties are delayed until low workload periods or termination of the event.

The team's planning horizon is proactive; that is, always "one or two steps ahead." This is evidenced through reprioritization of treatment and disposition plans for some or all of the patients within the team's area of responsibility. Replanning may occur for some patients.

Team members maintain situation awareness of the progress of their patients in the ED process (evaluation, treatment, and disposition) and of possible operational impediments to that progress. All changes in patient conditions and ED operational status are verbalized and acknowledged. Team members also maintain situational awareness of other team members' well-being (e.g., emotional or physical conditions that may affect performance). Team members volunteer information on themselves so that others may be supportive.

Acceptable Rating (4)

The team responds to problems in carrying out a treatment plan or protocol without overreacting. The physician's or situational leader's requests for information are met by feedback from the team. The team generally takes actions to reduce each other's task load and in most situations provides information even if it is not specifically requested. The physician and team make good use of available resources. The team is intense but only mildly flustered by most clinical situations.

Most distractions are avoided. The team performs well in deciding what information and activities are essential to the clinical event. Most nonessential information is discarded or ignored. Non-critical duties are prioritized and delayed until low workload periods or the event has terminated. Team members are aware of individual team member workloads during each phase of a clinical event. When an individual team member appears to be overloaded, other team members may notice and take on part of the workload. Workload sometimes appears poorly distributed and may require the team leader to delegate responsibilities. The team's replanning and reprioritization are adequate for the developing situation.

Team members often check each other's task performance for errors. An individual making an error is informed and makes the needed corrections. Only occasionally are persons in error annoyed at being checked and corrected.

Team members usually provide situation updates on patient and ED operational status. Obvious changes in team member welfare are noted and acknowledged without fear of sanctions.

Very Poor Rating (1)

The team becomes disorganized and flustered. The team's requests for information elicit inadequate responses. Team members may focus on the wrong issues, thus delaying correct response to the problem. Lack of coordinated actions adds to the confusion. The physician and team members make poor use of available resources to resolve the problem.

The team is easily distracted. The team is unable or unwilling to decide what is important and relevant to the immediate situation. There is little prioritizing of duties or actions. Time and energy may be wasted on low priority tasks. Risks to patient safety or welfare may occur as the team focuses on minor tasks while critical tasks requiring immediate attention go unattended. Neither the overloaded party nor other team members take voluntary actions to eliminate an overload condition. The team makes little or no effort to redistribute task responsibilities as situational changes occur and new tasks arise. The team's planning horizon is "playing catchup."

Team members seldom, if ever, check each other's task execution. Team members are insulted if they are corrected by another team member.

Team members do not routinely provide updates on patient status or operational status of the ED. Generally, updates are provided only on request; they are not made voluntarily. Personal welfare problems such as fatigue or lack of attention are not mentioned.

Emergency Team Dimension 4: Support Team with Information and Actions

This rating covers the assessment of the quality of information exchange within the team and the degree of reciprocity among team members in giving and receiving information and assistance. The rating also includes an evaluation of the team's adequacy in obtaining information from patients and providing information to patients.

Completeness, timeliness, and quality of information transfer. Consider both oral and written communications. Rate the information value and clarity of team member communication in terms of its timeliness, completeness, and avoidance of ambiguity. Include in the evaluation the use of feedback to verify information transfer. Evaluate the quality of instructions and statements associated with a patient's evaluation and emerging treatment plan. Also, take into consideration information exchange with patients. Patient-oriented examples include obtaining essential history and symptom information, updating patients on the status of their diagnosis and treatment, and providing discharge instructions.

Supporting information and actions sought from the team. Rate the extent to which team members, particularly the physician or situational leader, seek supporting information and actions from the team. Evaluate the degree to which team members raise questions regarding plans, revisions to plans, actions to be taken, and the status of key information. Note: The extent to which team members contribute to decision making should be observed here but evaluated under Emergency Team Dimension 2: Apply Problem Solving Strategies.

Supporting information and actions offered by the team. Rate the extent to which team members anticipate and offer both supporting information and actions. Supporting information is offered by team members to the decision maker or situational leader evaluating a situation or preparing to make a decision. Team members' initiatives and responsiveness to help others perform their tasks are also evaluated.

Decisions and actions communicated and acknowledged. Rate the extent to which a course of action is announced to the team members after decision-making input is solicited from them. Team members should respond verbally or with appropriate adjustment to their behavior and actions to clearly show that they understand when a decision has been made and what it is. Failure to announce a decision may confuse team members and lead to uncoordinated operation. Note: Due to time constraints in certain situations, there is often little or no time for teams to make inputs to a decision. In such cases, raters should focus on the extent to which decisions are announced and acknowledged verbally or through coordinated, pre-planned action.

Superior Rating (7)

Team members communicate with each other and their patients frequently. Both senders and receivers use standard terminology and unambiguous language for all communications. Senders usually provide clear, concise information. Receivers acknowledge nearly all messages in sufficient detail so that the sender can verify that the receiver understands the message. Receivers freely ask questions to clarify their understanding. Senders pursue feedback when no response is forthcoming. Whenever a workload shift or task responsibility transfer occurs, the change is communicated and acknowledged by the team. In the case of communicating with patients, team members offer frequent updates in language the patient can understand. Patients' questions are answered as completely and thoroughly as possible. Discharge instructions are carefully explained and supplemented with written instructions.

When the physician is formulating a diagnosis or a situational leader is making a decision, he or she alerts the primary care team and seeks suggestions on possible solutions and important information to consider. The physician or situational leader is open to all suggestions. Team members respond to these inquiries with sound, task-focused discussions and clear answers provided in a timely manner. Team members raise questions on diagnoses and treatment plans or changes to plans and actions. Nearly all these inquiries surface information that contributes to the decision making process. The physician states decisions and intended actions and, time permitting, explains the reasons and intent. Team members acknowledge the decisions with a clear verbal response and ask questions to clarify any confusion. The physician answers all questions in a positive, straightforward manner.

Team members are particularly attentive to communicating workload changes and information essential for maintaining situational awareness. All team members seek assistance and information from others in performing their tasks. Similarly, all team members anticipate the task needs of other team members and offer relevant information and assistance. Offers of assistance cover the range from highly skilled to mundane tasks. Team members keep one another informed of the results of their activities and changing task responsibilities.

Acceptable Rating (4)

Team members communicate about individual patients and general operational issues as required. Standard terminology and unambiguous language are usually used. Receivers acknowledge most messages. Receivers occasionally ask questions for clarification. Senders usually pursue feedback when no response is forthcoming. Team members are appraised of changes to significant factors and task responsibilities during clinical events. Duties are specified and communicated to others. Patients' questions are answered in understandable language and updates are offered intermittently.

Discharge instructions are brief and to the point and supplemented with written instructions.

The physician reviews available patient clinical data and asks team members for essential information to arrive at a diagnosis, make decisions, and formulate a plan of action. Time permitting, the physician offers team members a brief explanation of his or her diagnosis and plans. The team acknowledges its awareness of the physician's decisions and directions. Team members may ask questions to clarify confusion. The physician answers questions clearly and quickly. In situations of less well-defined diagnostic or problem resolution certainty, the physician alerts the team to the need for more extensive information exchange. Team members usually respond to these inquiries with brief exchanges that may provide previously uncommunicated information or insightful suggestions. The physician listens to new information and suggestions without interruption or criticism and asks for clarification as necessary.

Team members tend to focus their information gathering and exchange on patients within their individual spheres of responsibility. The team as a whole maintains a general awareness of the status of all patients being cared for by the team. The team may or may not be aware of the general status of operations within the ED. Changes to situation awareness are verbalized across the team as the workload changes. Team members sometimes seek assistance and information from others in performing their individual tasks. Similarly, all team members anticipate the task needs of others and offer relevant information and assistance as their individual workload permits. Task demands dictate the level of information exchange and reciprocity of helping behaviors. That is, urgent or emergent situations reveal heightened levels of verbal exchange and greater task interaction than nonurgent situations.

Very Poor Rating (1)

Team members may fail to make statements regarding critical information. Non-standard terminology is used or standard terminology is used inappropriately. Sender messages may be inappropriately delayed or irregular and may be confusing. Receivers usually do not verbally acknowledge the receipt of messages. Receivers do not ask questions. Senders do not pursue feedback when no response is forthcoming. Changes in responsibilities during an event are often not communicated and may result in confusion over who has a task responsibility. Information may be incomplete or confusing. Patients' questions are answered but without regard to the clarity or understandability of the answers. Generally, updates are provided to patients only on request; they are not offered voluntarily. Discharge instructions are cursory and written instructions may not be reviewed.

The physician makes decisions without seeking inputs from other team members or alerting the team that a decision is required or is being made. Decisions and intentions of the physician or situational leader are often not passed on to the team.

Decision making and planning are done by one individual with little or no discussion—an observer will have difficulty noting this quality for "very poor" teams because it is hard to detect individual decision making. The team is often not aware that a decision has been made. As a result the team does not offer suggestions and inputs to support decision making or actions. Team members almost never raise questions about plans, actions, or changes to plans. The physician may not acknowledge or respond to questions, or may abruptly answer them. Two physicians may attempt to simultaneously take control of a patient when control authority has not been negotiated.

Team members infrequently ask for team assistance with tasks even when they are overloaded to the point of nearly failing to properly execute them. The team generally does not offer its services to support task execution by other team members. Team members may discourage others from asking questions or seeking assistance by the tone of voice they use or by failing to respond. Team members may take uncoordinated actions without stating intentions or results.

Emergency Team Dimension 5: Improve Team Skills

This rating concerns the ability of the team to monitor and review its general performance, evaluate the quality of its work, and improve its work processes. Evaluate the team on spontaneous and planned discussions of its strengths and weaknesses with respect to technical skills and team coordination. Discussion themes include what was done wrong, what might be done better, how improvements can be made, and what was done very well.

Rate the occurrence of situational teaching and learning that occurs as events unfold. One example is a physician discussing his clinical impressions with a nurse following his or her examination of a patient. Another is an EMT explaining to a physician the proper positioning of a patient for intubation.

Rate the frequency and adequacy of the team's process reviews. Process reviews provide a mechanism for process analysis and quality improvement and focus on methods for improving team effectiveness. Rate the team's use of the five team dimensions to systematically examine and benchmark its performance. This requires recurrent examination of both technical task and team coordination outcomes, and answers the questions, "What is the team doing?" and "How well is the team doing it?"

Reviews can be informal or formal. Informal reviews tend to occur close to the time of the event and are likely to be limited to those directly involved in the situation. An example is two team members discussing how to improve their coordination on a procedure they have just completed. Formal reviews can occur as retrospective audits or case conferences. They are usually scheduled in advance and provide an opportunity for more team participation. An example of formal reviews are educational forums typically taking place away from the immediate clinical area. They are usually scheduled to maximize team member attendance

Superior Rating (7)

This team demonstrates exceptional attention to critiquing and improving task and process skills. Instruction and case review occur whenever opportunities arise and circumstances allow. Reviews equally address task issues (i.e., quality of clinical interventions) and process issues (i.e., team effectiveness). The team dimensions are integrated into all critiques of team performance.

Expert coaching and teaching are provided by team members. Team members demonstrate an interest in learning and teaching, and actively seek opportunities for both.

Formal reviews are conducted at regularly scheduled intervals. The team reviews clinical outcomes to improve the quality of care delivery. Reviews are conducted in a professional manner with an emphasis on education and improvement of task performance. Superior teams balance clinical case review with team performance review. For example, a clinical case conference is held to discuss a particularly complex clinical case. In addition to reviewing the clinical course of events, the team also considers the effectiveness with which team processes such as decision making, communication, and workload distribution were managed during the case.

Members are comfortable giving and receiving critical feedback; they freely discuss how the team is functioning and make recommendations for improvement. All discussions focus on behavior and information and avoid accusatory tones. Innovation and creative problem solving are encouraged. Recommended improvements are implemented and outcomes reevaluated as part of a continuous process.

Acceptable Rating (4)

Situational teaching and learning occur on occasion, usually in response to a direct inquiry from another team member. Although there is some reluctance to reveal one's limitations, team members will approach certain individuals on the team for assistance with their learning needs. Formal reviews occur on an intermittent basis.

When members engage in performance review, attention is paid more to clinical issues than to team process issues. Case reviews focus on obvious errors and identification of methods for avoiding these errors in the future. If one member of the team is technically weak, others can compensate and take advantage of the situation to teach a new skill or improve one that is weak.

Process review occurs most often following an event in which team performance was perceived to be problematic or contributed to a negative patient outcome. The team is less systematic about using the team dimensions as a reference for performance review. Interactions are positive and remain focused on behavior and decisions; there is no "finger pointing." Reviews are aimed at correcting the immediate problem rather than on improving general team performance.

Very Poor Rating (1)

Team effectiveness is rarely reviewed. There is no evidence of internalization of the team dimensions and no systematic approach to performance review. There is little effort to learn from previous actions. Virtually no teaching is observed even when clear opportunities to do so arise.

Obvious errors are corrected with little or no concern about improving future performance. There are times when basic procedures are ignored or violated. Opportunities for skill development are overlooked. Members are uncomfortable giving or receiving feedback. When case reviews occur (which is rare) they usually involve finger-pointing and blaming.

Appendix B

Staff Satisfaction Survey

Emergency Department Staff Survey

Instructions

The purpose of this survey is to assist researchers at Dynamics Research Corporation gain a better understanding of the operations of the emergency department. The survey consists of a series of questions that ask you to rate various aspects of your working environment. In addition, you are asked to provide some descriptive data about your professional experience.

Circle the rating on the seven-point scale that best describes the extent of your agreement or disagreement with the statement. Your answers should reflect your judgements of the actual situation in the department, and not the ideal situation. Please read each question carefully and be truthful with your answers.

The questionnaire should take approximately 20 minutes to complete. The first page of the questionnaire asks you for background information. The next four pages contain statements for which there are no "right" or "wrong" answers. We are simply asking for your honest opinion about each statement. Please consider each statement carefully.

It is essential that you complete the questionnaire by September 27, 1994. Place your completed questionnaire in the attached, stamped envelope and return it to Dynamics Research Corporation. Or, if you are taking the Emergency Team Coordination Course, you may bring the completed questionnaire and give it to one of the course instructors. Your name is on the envelope only for the purpose of checking to see who has returned the questionnaire. The envelope will be discarded on receipt. Your anonymity is guaranteed.

THANK YOU FOR YOUR PARTICIPATION

IMPORTANT

The information you provide in this questionnaire is confidential and will be used for research purposes only. Your answers will not be attributed to you personally nor become part of any personnel records kept in your employee file.

I. DEMOGRAPHIC DATA

1. **Identify your academic degrees:**
   (Circle all that apply)

   High School Diploma   BS or BA
   Nursing Diploma   Masters
   Associate   MD

2. **Identify your professional licensure:**
   (Circle item that applies)

   LPN
   RN
   Medical License

3. **Identify your professional certifications:**
   (Circle all that apply)

   BLS   ACLS
   ATLS   Other (Specify):
   PALS   _____
   TNCC   _____
   CEN   _____
   FACEP
   Medical Board Certification - Other

4. Number of years and months in the emergency care system   _ _ Yrs _ _ Mos

5. Number of years and months at Lowell General Hospital   _ _ Yrs _ _ Mos

6. Number of years and months in Lowell General Hospital ED   _ _ Yrs _ _ Mos

7. Primary Shift: Day   Evening   Night   Variable
   (Circle One)

8. Status: Full-time   Part-time   Per Diem
   (Circle One)

9. Number of hours worked during a normal week _ _

10. Cross-indexing Code   (*Note*: Because the results of this questionnaire will be correlated with other measures, the last four digits of your social security number are required.)

    Last Four Digits of Social Security No.: _ _ _ _

11. Today's Date: _____

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

II. SHIFT STRUCTURE AND INTERPERSONAL CLIMATE

101.	The goals of the emergency department are understood by staff members.	1	2	3	4	5	6	7
102.	The emergency department has a mission.	1	2	3	4	5	6	7
103.	The emergency department has a sense of team spirit.	1	2	3	4	5	6	7
104.	During their shift the nurses know who is assigned to various areas of the ED.	1	2	3	4	5	6	7
105.	During their shift physicians know who is assigned to various areas of the ED.	1	2	3	4	5	6	7
106.	Members of the ED are aware of the skills and abilities of their coworkers.	1	2	3	4	5	6	7
107.	There is mutual support among members of the ED staff.	1	2	3	4	5	6	7
108.	Interpersonal relationships among the ED staff are positive.	1	2	3	4	5	6	7
109.	On my shift I am clear about who's in charge.	1	2	3	4	5	6	7
110.	Disagreements are resolved on an amicable basis.	1	2	3	4	5	6	7
111.	Physicians and nurses thank one another for help received.	1	2	3	4	5	6	7
112.	Our ED personnel have mutual respect for one another.	1	2	3	4	5	6	7
113.	I rely on my coworkers to provide support and encouragement.	1	2	3	4	5	6	7
114.	Members of my shift cooperate to get the work done.	1	2	3	4	5	6	7
115.	Staff members behave more like independent practitioners than collaborators in our department.	1	2	3	4	5	6	7
116.	Members of my shift have confidence that we can perform effectively.	1	2	3	4	5	6	7
117.	My shift can take on nearly any situation and respond effectively to it.	1	2	3	4	5	6	7

III. PROBLEM-SOLVING STRATEGIES

201.	ED staff caring for a patient share in making decisions about that patient's care.	1	2	3	4	5	6	7
202.	ED staff contribute valuable information that influences the diagnosis and care of a patient.	1	2	3	4	5	6	7
203.	ED staff are open to information from their coworkers when making decisions about a patient's care.	1	2	3	4	5	6	7

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
204.	Most members of my shift get a chance to participate in decision making regarding their patients.	1	2	3	4	5	6	7
205.	I have a say in what care is provided to a patient.	1	2	3	4	5	6	7
206.	I am expected to be assertive.	1	2	3	4	5	6	7
207.	We do preplanning for certain situations such as the arrival of an ALS patient.	1	2	3	4	5	6	7
208.	We do a good job of developing an individual plan for a patient's care once the initial assessment has been done.	1	2	3	4	5	6	7
209.	We have general department-wide treatment plans and protocols for critical or time-stressed situations.	1	2	3	4	5	6	7
210.	It is acceptable for a staff member to advocate a particular course of action while planning for a patient's care in the ED.	1	2	3	4	5	6	7

IV. EXECUTING PLANS AND MANAGING WORKLOAD

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
301.	Members of my shift maintain an awareness of the overall situation in the emergency department.	1	2	3	4	5	6	7
302.	My shift responds well to changes in workload.	1	2	3	4	5	6	7
303.	Clinical algorithms and protocols used in our department are useful for providing good patient care.	1	2	3	4	5	6	7
304.	Our department has a good system for reassessing the prioritization of patient care as the situation in the ED changes.	1	2	3	4	5	6	7
305.	When things get busy our department has effective ways of distributing workload and managing resources.	1	2	3	4	5	6	7
306.	Members of my shift sense when another coworker is becoming excessively busy and step in to offer assistance.	1	2	3	4	5	6	7
307.	All the staff members caring for a patient are involved in the initial planning and subsequent replanning of the care for that patient.	1	2	3	4	5	6	7
308.	Members of my shift watch out for errors or slips by a coworker.	1	2	3	4	5	6	7
309.	Members of my shift let a person know if they suspect that person has made an error.	1	2	3	4	5	6	7
310.	Members of my shift rely on the charge nurse to manage our resources.	1	2	3	4	5	6	7

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
311. Physicians in my department involve the nurses in the process of planning for a patient's treatment and care in the ED.	1	2	3	4	5	6	7

V. COMMUNICATIONS

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
401. Information on a patient's location, such as in X-ray, is not readily available when I need it.	1	2	3	4	5	6	7
402. Sometimes I am given a clinical order that is confusing or ambiguous.	1	2	3	4	5	6	7
403. Doctor's orders and directives are given in clear and complete language.	1	2	3	4	5	6	7
404. Members of my shift routinely offer information to aid in the planning and decision making processes related to patient care.	1	2	3	4	5	6	7
405. Members of my shift anticipate the needs of coworkers and offer assistance without having to be asked.	1	2	3	4	5	6	7
406 Other members of my shift depend on me for information needed to perform their tasks.	1	2	3	4	5	6	7
407. I can accomplish most of my tasks without information from other members of the shift.	1	2	3	4	5	6	7
408. Members of my shift are willing to share information with other coworkers.	1	2	3	4	5	6	7
409. Information related to a patient's clinical progress, such as notification that X-rays or lab test results are back, is not readily available.	1	2	3	4	5	6	7
410. We keep patients updated about the progress of their treatment in the ED.	1	2	3	4	5	6	7
411. Coordination of activities is hampered by poor communication within our department.	1	2	3	4	5	6	7
412. Exchanges between doctors and nurses are friendly.	1	2	3	4	5	6	7

VI. IMPROVING SKILLS IN WORKING TOGETHER

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
501. There are opportunities during a shift for staff members to share knowledge and to help one another to sharpen technical skills.	1	2	3	4	5	6	7
502. We take advantage of opportunities to informally learn new skills or acquire new knowledge as situations present themselves during the workday.	1	2	3	4	5	6	7

		Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
503.	ED attending physicians are willing to explain a procedure in progress or discuss clinical findings.	1	2	3	4	5	6	7
504.	Improving teamwork skills is important.	1	2	3	4	5	6	7
505.	Other staff members evaluate my skills partly based on my ability to work as a team player.	1	2	3	4	5	6	7
506.	Sometimes we do an informal "after-action" review to learn from a particular experience.	1	2	3	4	5	6	7
507.	Members of our department are uncomfortable giving feedback to a coworker in order to improve his or her skills.	1	2	3	4	5	6	7
508.	Errors are pointed out more with a critical, rather than a corrective, attitude.	1	2	3	4	5	6	7

VII. SATISFACTION WITH WORKING IN THE EMERGENCY DEPARTMENT

601.	I enjoy the relationships with my coworkers.	1	2	3	4	5	6	7
602.	I receive personal satisfaction from the work I do.	1	2	3	4	5	6	7
603.	I look forward to coming to work.	1	2	3	4	5	6	7
604.	The emergency department provides the support I need to do my job.	1	2	3	4	5	6	7
605.	Morale in the emergency department is good.	1	2	3	4	5	6	7
606.	We could improve the quality of teamwork in the emergency department.	1	2	3	4	5	6	7

Appendix C

Core Staff Rating Form

Core Staff Rating Form

Emergency Team Coordination Course Team Dimensions

Instructions

The purpose of these ratings is to obtain estimates of the quality of team behavior for various core teams in the Department of Emergency Services. In order to provide these ratings, you need to divide your staff into groups of individuals that routinely work together. For example, you might identify three groups that consist of the *day, evening*, and *night* shifts. To help us understand what constitutes the teams you are rating, identify the types and number of personnel that comprise each group, and give that group a descriptive name. For instance, one group may consist of five nurses, one aid, and one physician which you call the *Day Shift*. It is not necessary to provide the names of the staff members comprising the team. The groups you identify and rate should be sufficiently stable so that you can rate them again in 4 to 6 weeks.

Next, thoroughly familiarize yourself with the descriptions of the five Team Dimensions provided on the attached list. Take care to rate the teams in terms of the comprehensive behavioral descriptions. Once you are clear on the differentiations between superior, acceptable, and very poor ratings for each team dimension, rate your teams using the seven-point scales. One other important point: Rate each core team in terms of the behavioral descriptions; do not make ratings by comparing the teams to one another.

Please complete your ratings by September 27, 1994. Thank you.

Team Ratings

Rater's Name: _____

Date: _____

Team Descriptive Name: _____

Personnel:

Position Title	# of Personnel
MD	___
RN	___
LPN	___
_____	___
_____	___
_____	___

Rating Scales

	Very Poor	Poor	Marginal	Acceptable	Good	Very Good	Superior
Maintain team structure and climate	1	2	3	4	5	6	7
Apply problem solving strategies	1	2	3	4	5	6	7
Execute plans and manage workload	1	2	3	4	5	6	7
Support team with information and actions	1	2	3	4	5	6	7
Improve team skills	1	2	3	4	5	6	7

Team Descriptive Name: _____

Personnel: Position Title # of Personnel

MD ___
RN ___
LPN ___

_____ ___
_____ ___
_____ ___

Rating Scales

	Very Poor	Poor	Marginal	Acceptable	Good	Very Good	Superior
Maintain team structure and climate	1	2	3	4	5	6	7
Apply problem solving strategies	1	2	3	4	5	6	7
Execute plans and manage workload	1	2	3	4	5	6	7
Support team with information and actions	1	2	3	4	5	6	7
Improve team skills	1	2	3	4	5	6	7

(Duplicate this page as required for additional ratings)

Appendix D

Coaching Evaluation Questionnaire

Coaching Questionnaire

Please take a few minutes to complete this questionnaire on your experience with coaching on the five Team Dimensions. Your ratings and comments will help us determine the value of the coaching technique as a follow-up to the Emergency Team Coordination Course. Place your completed form in the attached envelope and return it to Elli who will forward it to DRC. Thank you.

Your Name (Optional): _____

Use this rating scale to evaluate the value of the coaching experience to you on each of the five Team Dimensions.

Team Dimension 1. Maintain team structure and climate (e.g., organize the team, cultivate team climate, show professional respect, establish leadership).

Coaching helped me to: Understand this team dimension   Yes No Not Applicable

                            Implement this team dimension   Yes No Not Applicable

Comment: _____

_____

_____

Team Dimension 2. Apply problem solving strategies (e.g., situational planning, engage in decision-making, practice advocacy and assertion).

Coaching helped me to: Understand this team dimension   Yes No Not Applicable

                            Implement this team dimension   Yes No Not Applicable

Comment: _____

_____

_____

Team Dimension 3. Execute plans and manage workload (e.g., prioritize tasks, cross-monitor, delegate responsibilities, distribute workload)

Coaching helped me to: Understand this team dimension   Yes No Not Applicable

                            Implement this team dimension   Yes No Not Applicable

        Comment: _____

_____

_____

Team Dimension 4. Support team with information and actions (e.g., support others with information and actions, seek information and actions from others, communicate and document decisions and actions)

Coaching helped me to: Understand this team dimension   Yes No Not Applicable

                            Implement this team dimension   Yes No Not Applicable

Comment: _____

_____

_____

Team Dimension 5. Improve team skills (e.g., engage in situational learning and teaching)

Coaching helped me to: Understand this team dimension   Yes No Not Applicable

                          Implement this team dimension   Yes No Not Applicable

Comment: _____

_____

_____

Do you have any suggestions for your coach to help improve his or her coaching style?

                        Yes   No

If you answered <u>Yes</u> or if you would like to make additional comments, please provide your suggests below.

Coach's Name: Beth Blair   Ann Locke   John Morey   Robert Simon

                                (Circle One)

Suggestions:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix E

Patient Medical Record Throughput Time Data

Table E-1

Summary of Patient Throughput Time Data Elements from Medical Records

Variable name	Description	Explanation
DATE	Date of visit	
DAY	Day of visit	1 = Sunday 2 = Monday etc.
REG_TIME	Registration time	Time patient registers identifying information with registration clerk
MRCD#	Medical record number	
TRIAGE	Triage time	Time of first set of vital signs
XRAY	Number of X-ray images completed	
LABS	Number of laboratory tests and EKGs completed	
MEDTIME	Medication time	Time medication administered by nurse
F_RN_NOTE	First nurse's note time	Time of first nursing note after initial nursing assessment (i.e., triage)
L_RN_NOTE	Last nurse's note time	Time of last nurse's note
DPT_TIME	Departure time	Time patient departed ED
D_STATUS	Disposition status	Discharged, admitted, or transferred to another facility
V_CODE	Visit code	Patient acuity status: Emergent, urgent, or nonurgent

Appendix F

Admission Evaluation Surveys

Emergency Department Admission Evaluation Questionnaire
Initial Draft

1. Time between report and patient arrival. _____

2. Documentation of patient valuables?   Yes or No

3. All cultures obtained?   Yes or No

4. Antibiotics administered?   Yes or No

5. Patient advised of patient bill of rights?   Yes or No

6. Is the patient in pain?   Yes or No

7. Is the patient aware of his/her diagnosis?   Yes or No

8. Is the patient's condition consistent with the ED report?   Yes or No

9. Has the patient been provided with an identification bracelet?   Yes or No

10. Is the heplock or intravenous site in working condition?   Yes or No

11. Was the patient's family advised of the patient's condition and where the patient was admitted to: Yes or No

12. Was report given by that patient's primary nurse?   Yes or No

13. Was report given by a covering nurse as a result of break-time or change in shift?   Yes or No

14. Are intravenous line and medications running at their described rate?   Yes or No

15. Have admission orders accompanied the patient to the floor?   Yes or No

16. Does the patient speak and comprehend the English language?   Yes or No

17. Was a translator available to the non-English speaking patient in the ER?   Yes or No

18. Was the patient pleased with the care he or she received in the Emergency Department?   Yes or No

Figure F-1. Emergency Department Admission Evaluation Questionnaire initial draft.

LOWELL GENERAL HOSPITAL
Department of Emergency Services

ADMISSION EVALUATION FORM

The Department of Emergency Services is conducting a study of how well patients have been prepared for admission to in-patient services. Once this patient has been transferred to your service, the patient's primary care nurse is asked to answer the following questions. Thank you for your cooperation.

---

1. Your unit or floor: _____

2. Date of patient's transfer to your unit or floor: _____

3. Time of patient's transfer to your unit or floor: _____

4. Did the following ED personnel conduct themselves professionally and courteously:

   a. Person giving report?   *Yes   No   N/A*

   b. Person transporting patient?   *Yes   No   N/A*

5. Have admission orders accompanied the patient to the floor? *Yes   No   N/A*

6. Is the patient's condition consistent with the ED report?   *Yes   No   N/A*

7. Is the intravenous site in working condition?   *Yes   No   N/A*

8. Has the patient been provided with an identification bracelet? *Yes   No   N/A*

**Return this form to the Nurse Manager,
Emergency Services via Interdepartmental Mail**
Thank You!

Figure F-2.   Admission Evaluation Form.

Appendix G

Critical Event Guidelines and Process Table

RECOMMENDED GUIDELINES
FOR CRITICAL INCIDENT REVIEW

Objective: To examine the existence of or need for implementing the five Team Dimensions in clinical practice through the process of retrospective audit.

Approach: The audit will be facilitated by a member of the DRC team. The clinical event under review will be presented by the physician-nurse team directly involved in the situation. The review will be conducted utilizing the five Team Dimensions as a guideline for discussion.

Ground Rules:

1. A summary of the situation to be reviewed will be forwarded to DRC facilitators no later than the morning of the day prior to review.

2. The critical incident will be presented in terms of **specific team behavior** and **recommended improvements.**

3. Discussion will be limited to team roles rather than specific individuals by name.

4. The review will be aimed at improving or acknowledging team performance and not at blaming individuals for perceived errors.

Table G-1

Clinical Performance Model Associated with a Clinical Event

Narrative	Clinical model	Team Dimensions	Notes
A 34-year-old male is escorted to an acute area bed by the triage nurse. With marked distress and labored speech, he states that he "can't breathe any more." RR is 40. He is noted to be diaphoretic. He has given a PMH of asthma.	Establish leader ❑ Assemble team ❑ Designate roles ❑ MD ❑ Primary RN ❑	TD #1 Team formation Situational leadership ❑ Triage becomes leader by virtue of patient's emergent status. She initiates the action. Leadership transfer - triage to MD	Leadership needs to be established in advance to eliminate delays in emergent patient presentation.
A physician approaches the patient who is sitting on the stretcher in a forward leaning position. The physician requests .3cc sc Epinephrine from the triage nurse. The physician places the patient on oxygen, as the triage nurse exits the room.	Establish leader ❑ Assemble team ❑ Designate role functions ❑ leader ❑ primary nurse ❑ airway ❑ documentation ❑	Team formation ❑	Simply through directives and body position MD becomes the leader! MD needed to go back to step two and define team and roles, BEFORE orders.
Minutes pass and no one returns with medication. The MD approaches the main desk to request the Epinephrine and IV access. Two RNs respond by initiating calls to support personnel and assembling equipment. One asks," Whose patient is this"? Someone else asks, "Who received report on this patient?" The patient receives Epinephrine, Terbutaline, Magnesium, Solumedrol, and Ventolin nebulizer.	Information exchange ❑ CRITICAL airway ❑ rhythm, monitor ❑ vitals ❑ Implement tasks ❑ O 2 , IV access, meds, ABG, monitor patient support ❑	Advocacy and assertion ❑ primary nurse interaction with patient to decrease anxiety Support information Documentation Triage/ primary interchange ❑	Informaation exchange provides a direct link to task implementation, particularly in CRITICAL exchange.

Table G-1

Clinical Performance Model Associated with a Clinical Event (continued)

Narrative	Clinical model	Team Dimensions	Notes
Following the interventions the patient's O 2 sat remained 89-90% on 5 liters. The patient states to the MD that he is tiring. With no sign of improvement noted, the physician makes a decision to intubate.	Assessment ❑ nursing interpretation ❑ breath sounds, RR, color, HR, sats Planning ❑ intubation ❑	Professional trust ❑ Decision making (EDD)	Did limited nursing assessment, in turn limit collaborative assessment and decision making for MD? Planning not proactive, but reactive. Did MD attempts to limit risk for patient?
Two nurses have entered the scenario at this point. One exits the room and requests that anesthesia be called. A second nurse, passing the charge nurse, briskly states that the patient is "being tubed" and that she needs meds. A third person comes from the room to look for the second ED physician.		Workload Management ❑ prioritization delegation task assistance cross-monitoring family update	Distracted from medical decision making when needed to oversee tasks. Many staff resources. Not organized. Increase in workload. Not a staffing issue.
An intoxicated patient in the next room attempts to climb out of bed and the charge nurse quickly enters to restrain him.	Implement tasks ❑ Role designation ❑ Charge nurse needs to assume operational management ❑	Situation awareness resource management needs	
At this point the family of the man being intubated enters the department and approaches the doorway of his room. They are quickly intercepted by an aide and directed back to the waiting room.	Patient disposition ❑ family update	WITHOUT FAMILY INTERVENTION EVENTUALLY WORKLOAD WILL INCREASE TO PROVIDE FAMILY INTERVENTIONS	
	Team review ❑ frequent talk and reflection		